AUGUST 1956 Vol. 18 No. 9

MINING WORLD

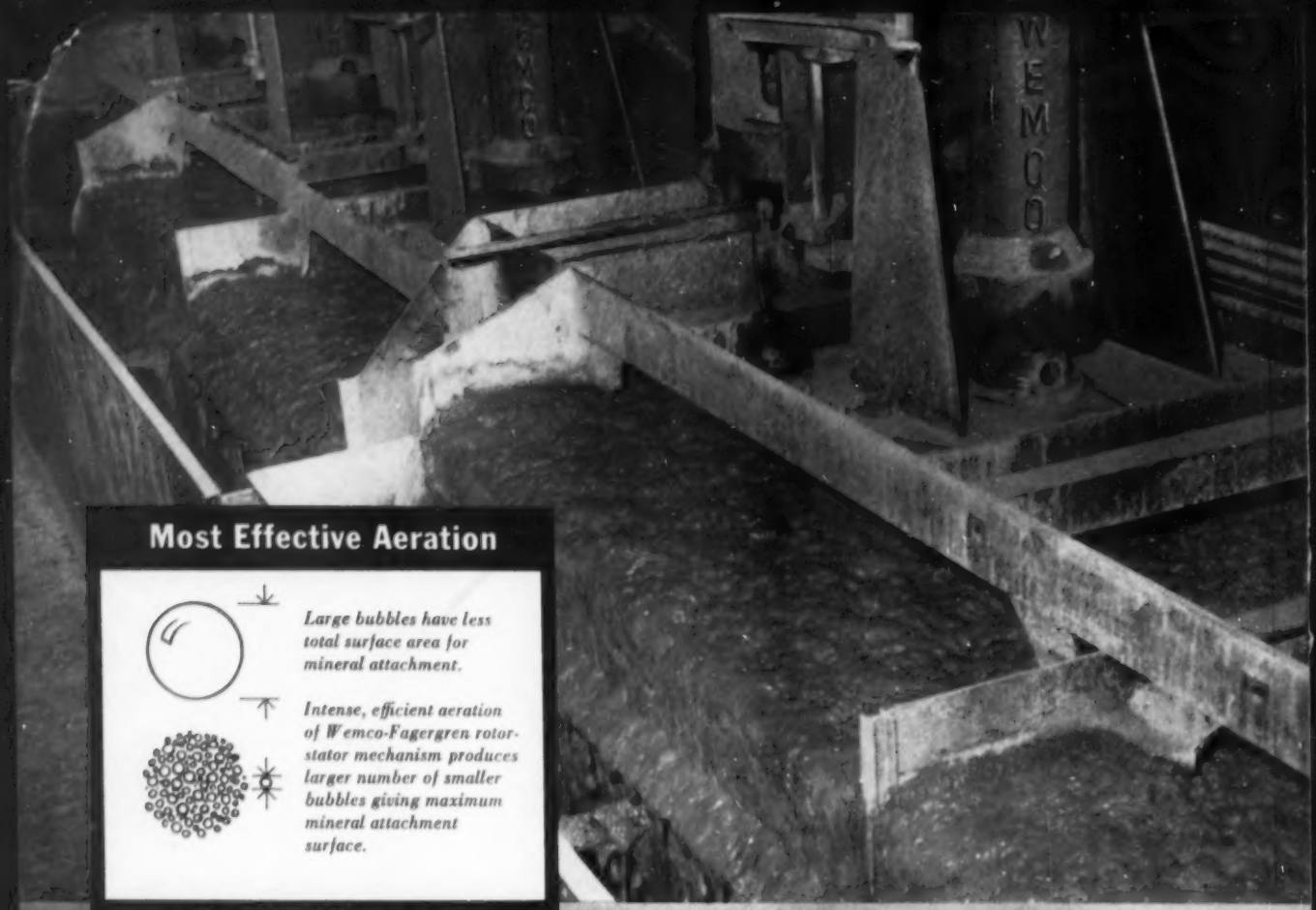
Fertilizer Cuts Blast Cost at Weed Heights

Southwest Potash Plans Haulage—Face To Surface

What's Ahead at Ambrosia Lake U_3O_8

Page 73

50 cents a copy—2s 6d in sterling

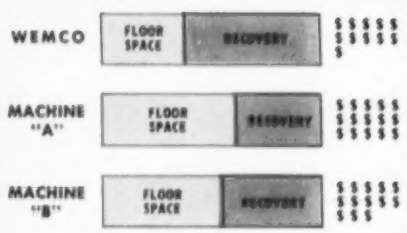


Most Effective Aeration

Large bubbles have less total surface area for mineral attachment.

Intense, efficient aeration of Wemco-Fagergren rotor-stator mechanism produces larger number of smaller bubbles giving maximum mineral attachment surface.

Greatest Recovery per Dollar



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1.5% more molybdenum
1.0% more copper
5.0% more silver
1-2% more gold
— with Wemco

by every competitive test... Wemco Fagergren proves best

In recent, rigorous testing with top-notch competitive equipment, Wemco Fagergren Flotation Machines proved best in recovery, grade, floor space, cost and maintenance — as the following test results indicate:

"...One goal of the test was *recovery*, without sacrifice in grade, and the *Wemco Fagergrens consistently led in this factor.*

"...as the test progressed there was a trend to increase tonnages of feed per machine. As these tonnages were increased, operating horse-power increased on all machines *except the Wemco Fagergrens.*

"...mechanical and design changes were made on several occasions in (two of the competitive) units. During the testing program *there were no mechanical revisions or design changes on the Wemco Fagergrens.*"

- And as final proof of their superiority, Wemco Fagergrens also excelled on such important counts as *simplicity of operation . . . least total number of mechanisms required . . . longer effective life of wearing parts.*

For more details of Wemco leadership, write today

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Representatives throughout the United States and Canada and in major countries around the world.

How a new **CAT*** No. 12 can

STEP UP YOUR MINE'S EFFICIENCY 3 WAYS

This new Caterpillar No. 12 Motor Grader maintains 16 miles of haul road and 'dozes truck spillage at the Hill-Trumbull Mine, Marble, Minn. It is owned by the Mesaba-Cliffs Iron Company and operated by the Cleveland-Cliffs Mining Company of Cleveland, Ohio. In building and maintaining haul roads for faster cycle times and reduced wear and tear on equipment, in 'dozing and clean-up work, the new Caterpillar No. 12 does a big and important job. Here is how it can do it at lower cost in *your* mine:

1. LOWER OPERATING COST. The new No. 12 delivers its 115 HP on non-premium, low-cost fuels. Its new oil clutch gives you longer clutch life, easier operation, and as much as 1500 hours between clutch adjustments. Tubeless tires (furnished at no extra cost) run cooler, last longer, and eliminate the tube and flap down time of old-fashioned tires.

2. LONGER WORK LIFE. Like all Caterpillar Motor Graders, the No. 12 is built—not just assembled—by a single manufacturer. This means traditionally sound Caterpillar ruggedness and workmanship, and careful balancing of engine and blade capacity for long life and high efficiency. And it means a single source for parts and service—your reliable Caterpillar Dealer.

3. INCREASED PRODUCTION. Positive, non-creep controls, easy "feel-of-the-road" steering, sure-footed traction with engine positioned over the driving wheels, quick-change blade positioning, unobstructed visibility—all these are good reasons why operators *like* the Caterpillar No. 12 Motor Grader, and do more efficient work on any job.

Your Caterpillar Dealer will demonstrate these and other features of the fast-working, long-lasting No. 12 Motor Grader. See him for proof that the Cat No. 12 will do more work at less cost on *your* job than any other grader.

Caterpillar Tractor Co., San Francisco, Calif.; Peoria, Ill., U.S.A.

CATERPILLAR*

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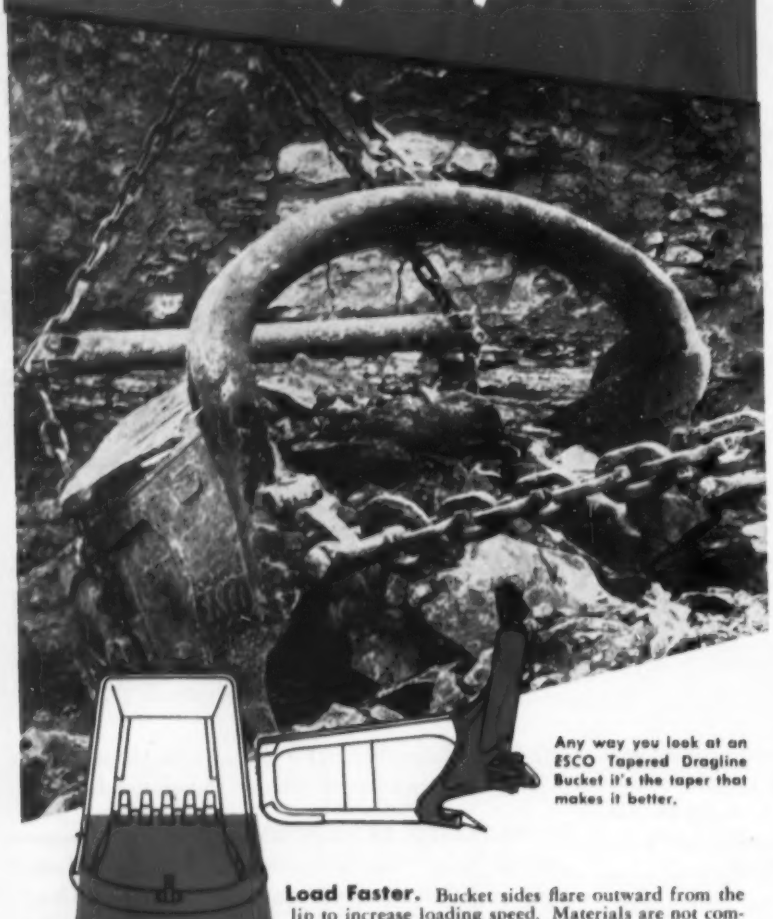
99% OF ALL CAT MOTOR GRADERS EVER BUILT ARE STILL AT WORK

ESCO TAPERED DRAGLINE BUCKETS

Load Faster, Dump Cleaner



Any way you look at an ESCO Tapered Dragline Bucket it's the taper that makes it better.

Load Faster. Bucket sides flare outward from the lip to increase loading speed. Materials are not compressed into the opening but allowed to expand and flow up and back along the tapered sides, filling the bucket completely without voids in the rear. Bucket fills in shorter drag distance—less line pull required.

Dump Cleaner. Taper from front to rear and outward flare from lip to arch allows load to drop quickly and easily from the bucket. Load always dumps clear of high tubular arch.

Last Longer. Tapered design reduces loading and dumping friction to an absolute minimum. Bucket lasts longer. All welded construction and the maximum use of alloy steel castings makes a high strength-to-weight ratio possible, resulting in "lower cost per yard operation".

ESCO Tapered Dragline buckets have proved their ability to load faster, dump faster and cleaner by thousands of hours of operation in all kinds of digging. Ask your nearest ESCO dealer for details today, or write direct.

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GRAB SAMPLES From the Mail

May Is Popular Issue

Dear Sir:

Please Airfreight further 50 copies May issue of MINING WORLD.

African Aerofall (Pty.) Ltd.
Johannesburg, Union of South Africa

Dear Sir:

Kindly forward 25 May issues of MINING WORLD by the most expeditious means.

Please bill us for charges and we will mail a check by return post.

McKENZIE & WHITTLE CONTRACTORS
Carlsbad, New Mexico

Nothing New Underground

Dear Sir:

On reading your WORLD MINING Yearbook, April 1956, I read on page 103, under "Greenland":

"This is the first plant in the world with all equipment placed in rock rooms under the surface."

The Consolidated Mining and Smelting Company of Canada in (about) 1935 built a complete 800-ton cyanide mill underground in the Big Missouri mine, Portland Canal district, British Columbia.

The purpose was also to defeat climatic conditions and, more particularly, snow slides.

W. E. AITCHSON
Mining Engineer
Noranda, Quebec

Pleased With World Mining

Dear Sir:

I am extremely pleased with your magazine and find the articles interesting and useful. Your international news also keeps me up-to-date with what is going on in the mining industry throughout the world.

R. CORNTHWAITE
Underground Manager
Kalulushi, Northern Rhodesia

Read With Interest by Staff

Dear Sir:

WORLD MINING is circulated to and read with interest by members of our staff. Recently a number of members of the staff were transferred to our Rhodesian office. As they are anxious to continue reading WORLD MINING, please change the mailing address for their copies.

SECRETARY
Anglo American Corporation
of South Africa, Ltd.
Johannesburg, Union of South Africa

WM Valued in Ethiopia

Dear Sir:

For the time being we are the only company doing exploration work in this area and we believe that in the future we will be able to do some mining if our study proves favorable.

In Eritrea the Eritrean government is doing some gold mining and we are sure they will be very much interested in your publication. The same applies for the Ethiopian government.

We have found WORLD MINING to be very useful and most appreciated.

M. GALLOTTA
President
Ethiopian American Mineral & Chemical, S.A.
Asmara, Ethiopia

Mining World

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ON THE COVER: This is New Mexico's Ambrosia Lake uranium district today. The rotary drill is at work on San Jacinto Petroleum Corporation's Section 32, T. 14 N., R. 10 W. lease. The Cessna 190 has just landed with engineers from Chapman and Wood, Albuquerque consultants who are in charge of drilling.

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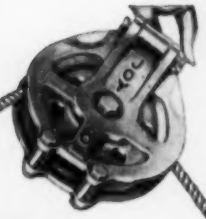

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with the Locking Pin that can't be lost!

Only Joy Sheave Blocks have the exclusive non-removable locking pin that—

1 Can't possibly loosen and fall out when locked in place

2 Loosens by non-removable key when sheave must be opened.

3 Hangs by a flanged end of locking key, never is removed completely from the sheave to be lost in the muck pile.

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- Sealed-for life bearings—keep lubricant in, dirt and water out.
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MOVING

the richest hill on earth

The open pit mining of copper ore from Montana's famous Butte Hill has added a new chapter to the long saga of underground mining at "the richest hill on earth."

Begun as a pilot operation by the Anaconda Company late in 1954, the open pit work has proved so successful that plans are going ahead for mining a near-surface ore reserve currently estimated at 100-million tons.

When the F & S Contracting Company of Butte were awarded this vital earth-moving job, they chose Mack LRVSW's. The popularity of these six-wheel, off-highway dumpers has been firmly established by an unmatched record of dependable and economical service. Day and night, winter and summer, these "big boys" stay on the job—handling the heaviest loads under all conditions. Mack Trucks, Inc., Plainfield, New Jersey. In Canada: Mack Trucks of Canada, Ltd.

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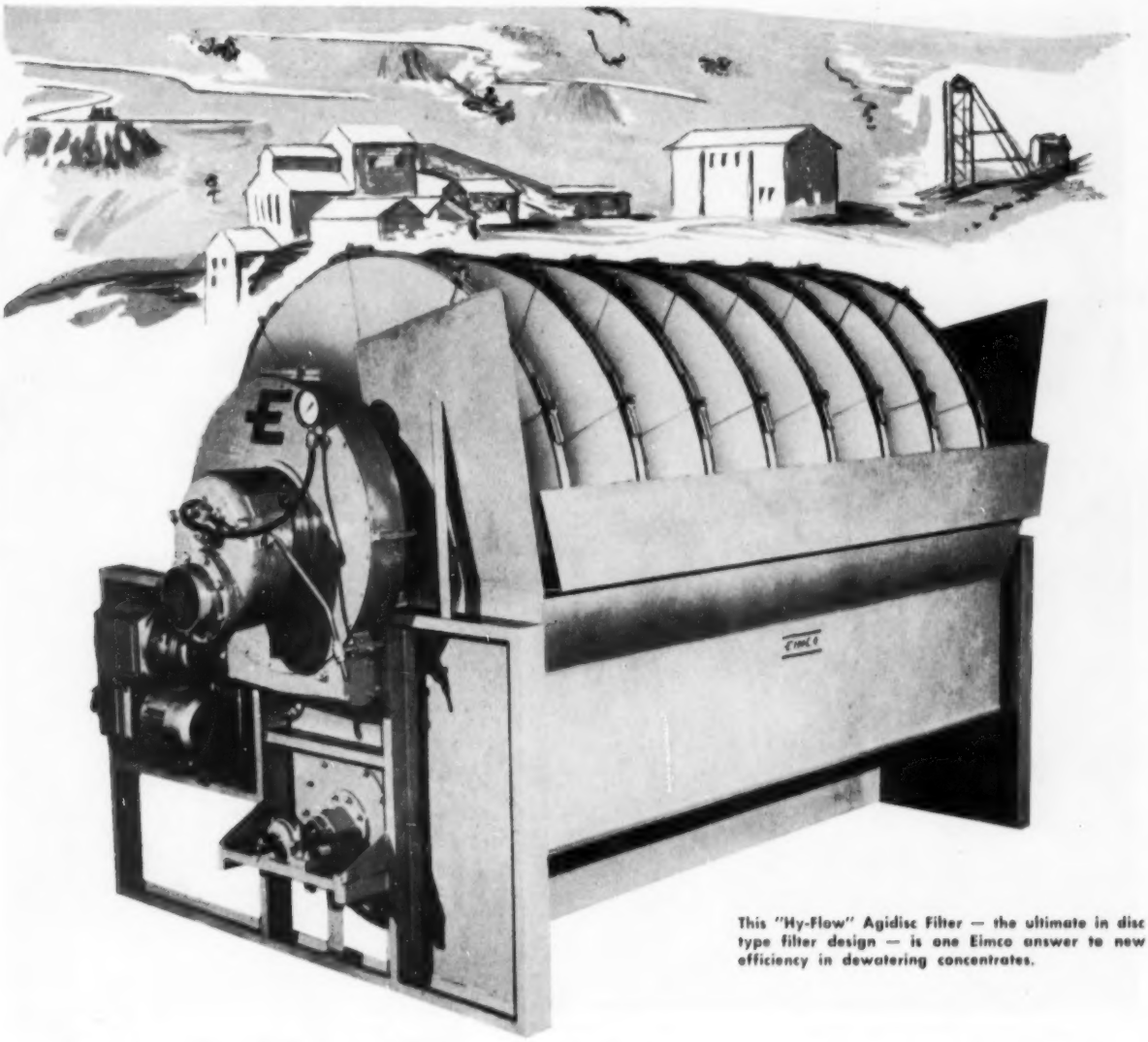

This "Hy-Flow" Agidisc Filter — the ultimate in disc type filter design — is one Eimco answer to new efficiency in dewatering concentrates.

EIMCO "HY-FLOW" AGIDISC NEW DESIGN FOR IMPROVED FILTRATION

Application of the Eimco "Hy-Flow" design to Agidisc filtration is proving to be a practical and money-saving formula for filtering many metallurgical concentrates.

This new design, which enhances operating efficiency in all zones of the filtration cycle, combined with the Agidisc's ability to maintain constant particle suspension, makes the Eimco "Hy-Flow" Agidisc a highly versatile filter.

Enlarged ports, streamlined passages and direct flow allow an unrestricted passage of liquids and gases from the filter media through the valve.

Also eliminated is vacuum loss, since turbulence and right angle resistance bends are no longer present. The "Hy-Flow" Agidisc incorporates newly designed valves, disc sectors, sector bells and trunnion barrels.

Eimco filtration engineers can produce comparison records to show that "Hy-Flow" Agidisc filtration has dewatered tonnage to a lower moisture content at lower cost than any other filter.

If your operation involves dewatering fast settling solids, the Eimco "Hy-Flow" Agidisc Filter could well be your solution to better filtration resulting in more profit.

Send your particulars to the Eimco Filtration Division. Their advice to you will be based on years of research and experience in the field.

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B-206

Steel arches "give" to make mining safer

The secret of safety in this ore drift lies in the Bethlehem Yieldable Arch sets which "give" instead of deforming under excessive load. The yielding feature is formed by over-lapping two adjoining nestable segments and fastening them together with heavy U-bolt clamps.

The tightness of the clamps controls the sliding action of the arch. Properly adjusted, the joints hold fast under normal loads. But when unusually heavy pressures begin to bear down, the joints yield before deformation of the steel can occur, permitting natural subsidence of the surrounding strata and redistribution of the load. The structural integrity of the arch is maintained and safety underground preserved.

There's real economy in these arches, too! First of all, thanks to their yieldability, they far outlive conventional timber supports and for this reason alone often pay for themselves within a year. And, on top of that, they are usually recoverable for re-installation elsewhere.

The Yieldable Arch is easy enough to install; no special tools or fancy equipment is needed. Your own men can set them up and take them down with only a minimum of technical supervision. Pictured above is the standard arch; you can also get Yieldable Rings or special shapes and sizes to meet your individual needs. A Bethlehem Pacific engineer will gladly give you full details.

BETHLEHEM PACIFIC COAST STEEL CORPORATION

Sales Offices: Los Angeles, Phoenix, San Francisco Portland, Seattle, Spokane

BETHLEHEM PACIFIC

BETHLEHEM STEEL

Standard Underground Eimco 630's Sink Shafts Faster — Cheaper.

You can save money and sink shafts faster using standard underground mucking equipment if it's an Eimco 630 Excavator.

On two recent occasions, contractors reported they were happy to leave special purpose shaft mucking equipment on the surface while the standard Eimco 630 did the entire excavating task.

They discovered as have many others that they can accomplish more with a smaller crew and minimum investment when a 630 is on the job.

There's no **special** rigging, **special** guides and **special** platforms to be lowered down the shaft with an Eimco.

Whether the shaft is circular or rectangular, the 630 is loading successfully for contractors.

And when the job is done, the 630 is ready to start excavating drift from the bottom of the shaft.

Eimco 630's are safe, fast and economical.

Write for Bulletin L-1039 today!

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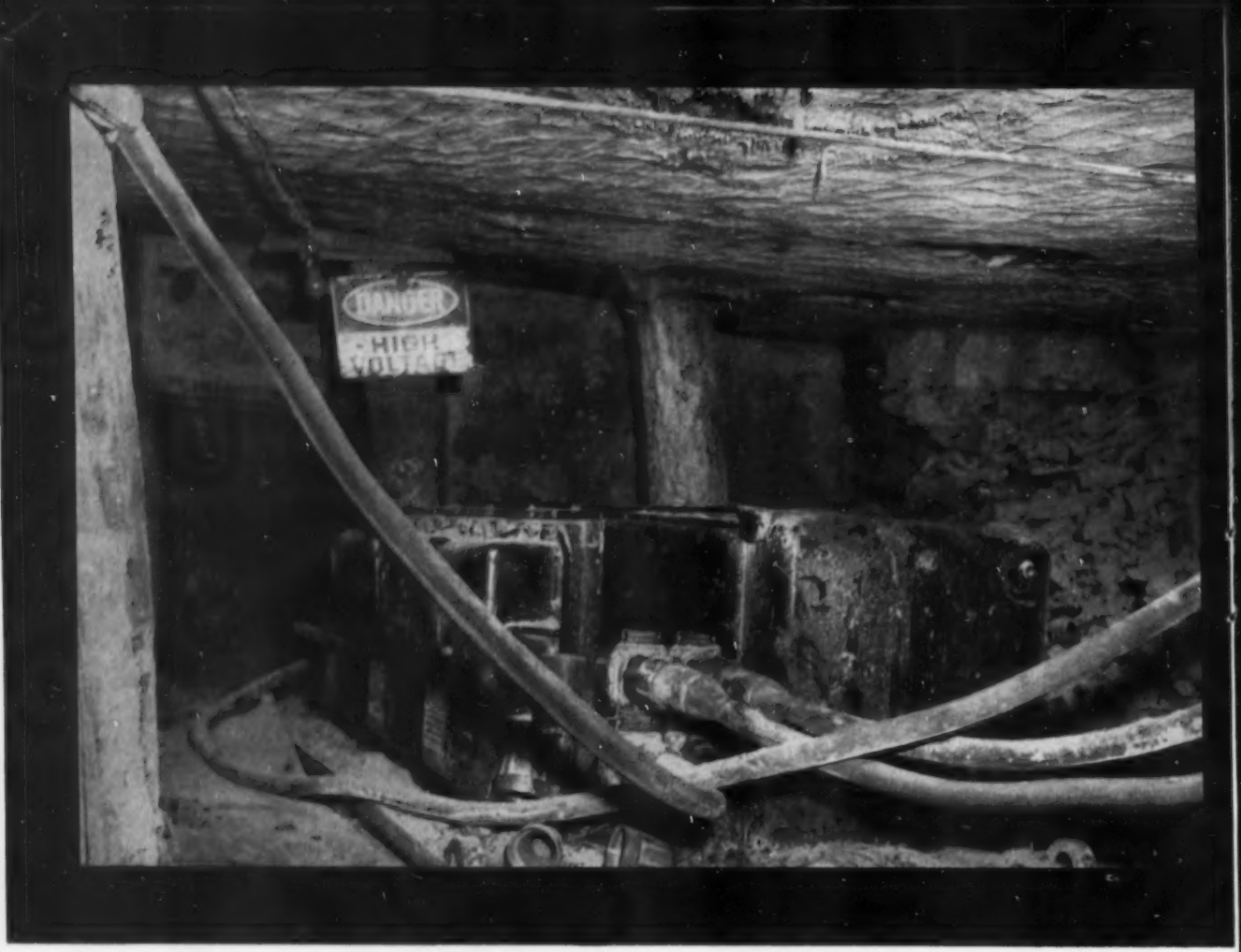
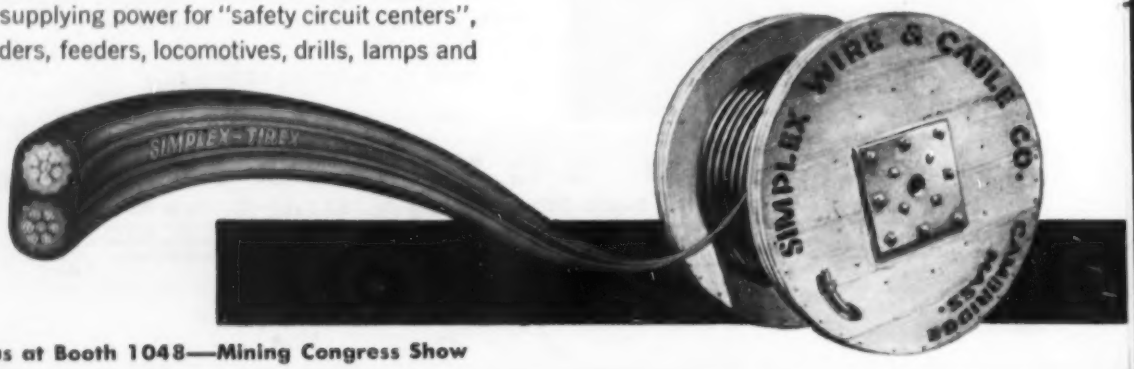


Margin for error: None

Mining, because of its very nature, requires "something extra" on the part of both men and equipment. Ruggedness and reliability are especially important, and it is this fact that accounts for the widespread preference for Simplex – TIREX cords and cables. These expertly engineered cords and cables, featuring exclusive CURED-IN-LEAD SELENIUM NEOPRENE ARMOR, are extremely flexible, and resist abrasion, oil and water. They are "on the job" in mines everywhere, dependably and safely supplying power for "safety circuit centers", for loaders, feeders, locomotives, drills, lamps and other items of equipment. Simplex-TIREX bears the molded markings of P-101-BM on its jacket, signifying acceptance by the U. S. Bureau of Mines, and approval of the Dept. of Mines, Commonwealth of Pennsylvania. Available in a wide range of sizes, at most mining houses and electrical distributors. Play safe whenever you order cords and cables—specify Simplex-TIREX! **SIMPLEX WIRE & CABLE CO.,** 79 Sidney Street, Cambridge 39, Mass.



LIVE BETTER ELECTRICALLY

Visit us at Booth 1048—Mining Congress Show

QUEBEC HYDRO-ELECTRIC COMMISSION USES EIMCO 105 TRACTOR-EXCAVATORS ON BERSIMIS PROJECT

The Quebec Hydro-Electric Commission supplied contractors on the huge Bersimis project with several Eimco 105 Tractor-Excavators as the most efficient machines available for certain phases of the job.

Eimco 105's worked on the penstocks at the powerhouse, loaded blasted rock at the diversion tunnel, mucked in the intake shafts, assisted in clean up of the main tunnel, loaded aggregate from the quarries and accomplished numerous other jobs including, (as shown above) the takeup of the bottom in the main tunnel.

The main tunnel bore at Bersimis is 7 miles long and excavated diameter was 45 feet. The intake shaft on the Diversion tunnel was 32 feet in diameter by 120 feet deep. The Bersimis project is scheduled to generate power by July or August of 1956.

Contractors have worked steadily in the face of adverse weather conditions to complete this great work at an early date. Eimco extends its heartiest congratulations on a job well done.

Eimco 105 Tractor-Excavators are at work throughout the world on Hydro-electric development projects, mines, roadbuilding, stockpile loading, pits and quarries and many other rough jobs. In many instances, the 105 is the only production equipment on the job—because its dependability is a well known and proven fact.

If your project calls for a tractor, bulldozer, or excavator, you'll want Eimco to supply you with full information about the versatile 105. Just send details of your project. You'll find, as have many others, that Eimcos will do the job faster, cheaper and better.

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B-318

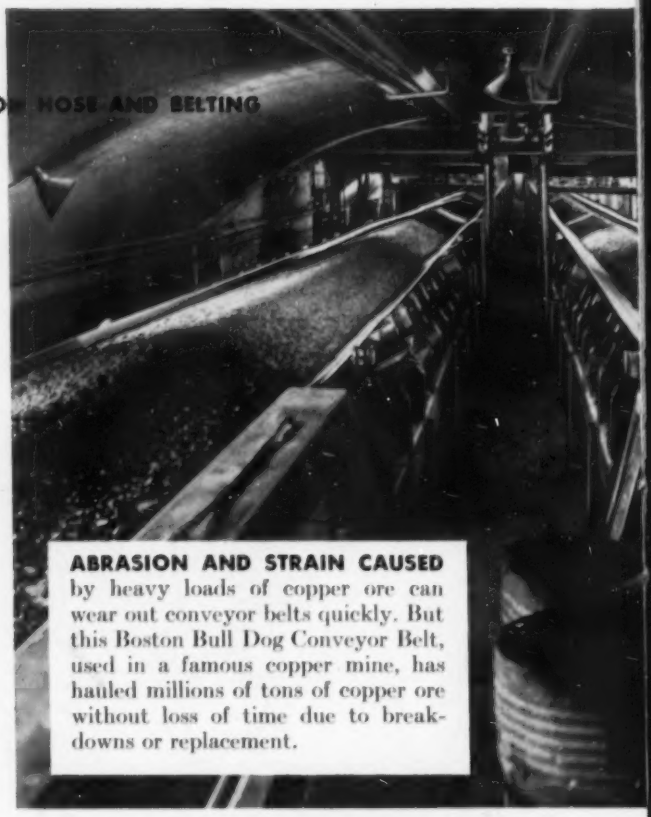
READ WHY SO MANY MINING MEN SPECIFY BOSTON HOSE AND BELTING

How to boost your production and reduce breakdowns at the same time

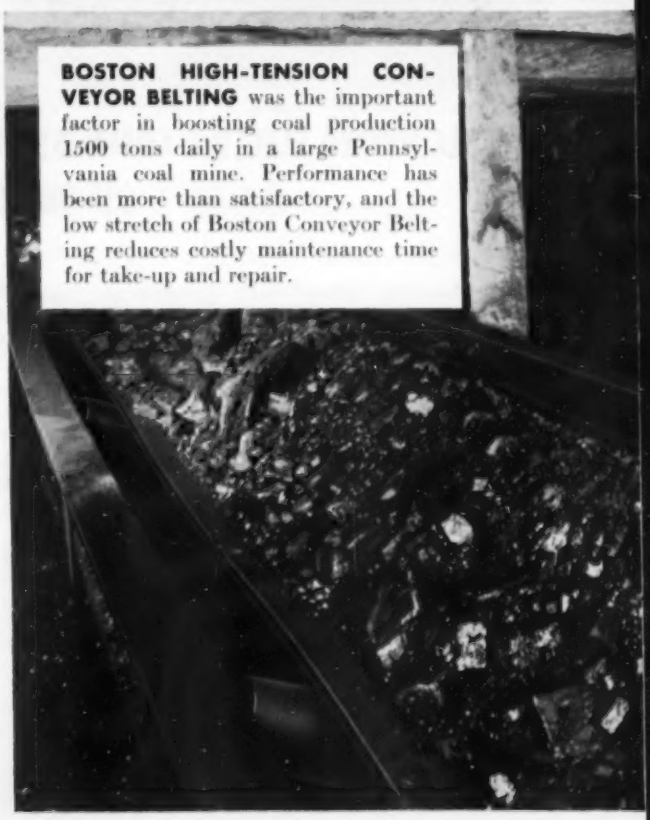
BREAKDOWNS ON ANY MINING JOB WASTE VALUABLE TIME, skyrocket production costs. That's why so many mine operators, engineers and foremen specify Boston hose and belting. They know Boston products help boost production by eliminating costly breakdowns and adjustments. Even on the very tough jobs, Boston hose and belting turn in performance you can rely on!

WHY SO RELIABLE? There's good reason. Boston specializes in industrial rubber products. *It's not just a sideline.* Boston Woven Hose & Rubber Company has one aim: to continue developing industrial rubber products that will outperform all others on the job.

SPECIALISTS IN GOOD SERVICE, TOO. Immediate delivery is no problem for your Boston Distributor. With his thorough knowledge of mining operations and industrial rubber products, he anticipates your needs, prepares to meet them. Better call your local Boston Man today!



ABRASION AND STRAIN CAUSED by heavy loads of copper ore can wear out conveyor belts quickly. But this Boston Bull Dog Conveyor Belt, used in a famous copper mine, has hauled millions of tons of copper ore without loss of time due to breakdowns or replacement.

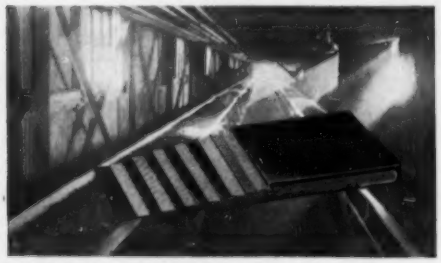


BOSTON HIGH-TENSION CONVEYOR BELTING was the important factor in boosting coal production 1500 tons daily in a large Pennsylvania coal mine. Performance has been more than satisfactory, and the low stretch of Boston Conveyor Belting reduces costly maintenance time for take-up and repair.

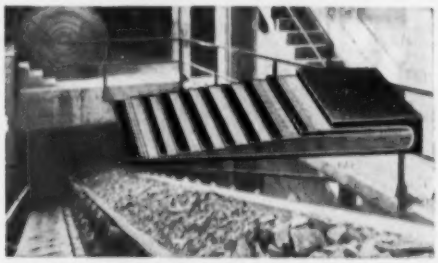
INDUSTRIAL HOSE • FIRE HOSE • BELTING • V-BELTS • PACKING

MATTING • TAPE

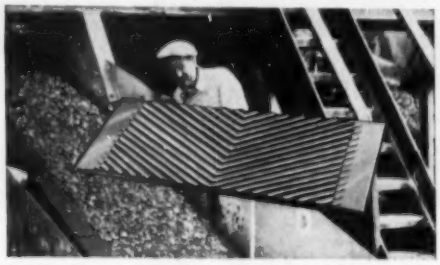
BOSTON CHECKLIST FOR YOUR HOSE AND BELTING REQUIREMENTS



BOSTON HIGH-TENSION BELTS: Cut your operating costs on long center and high lift conveyors with Boston High-Tension Belts. They need fewer, lighter plies to carry heavy loads. Boston's Rotocure process makes this possible by eliminating mechanical distortions and uneven stretch.



BOSTON CONVEYOR BELTS: Specific job engineering for length of haul and type of load means Boston belts give you outstanding performance on every job. One Boston Silver King Belt still serves a major coal company in Virginia after 20 years (the original drive wore out after 15 years).



BOSTON CUSTOM CONVEYOR BELTS: On special applications, Boston's know-how teams up with Boston's Rotocure process for job-right performance. One specially engineered Boston belt, used by a large iron mine on the Mesabi Range, lasted five times longer than competitive belts!

BOSTON TRANSMISSION AND V-BELTS: You get increased operating efficiency wherever you use Boston Transmission and V-Belts because they are specially designed to eliminate slippage, require fewer adjustments. That means fewer breakdowns, less wear and tear on motors.

BOSTON HOSE: Your Boston Man has a complete line of air hose, water hose, face hose and rock-dusting hose designed and engineered by Boston to give you superior performance, even on the tough jobs. His experience will help you pick the right hose for every application.

BOSTON

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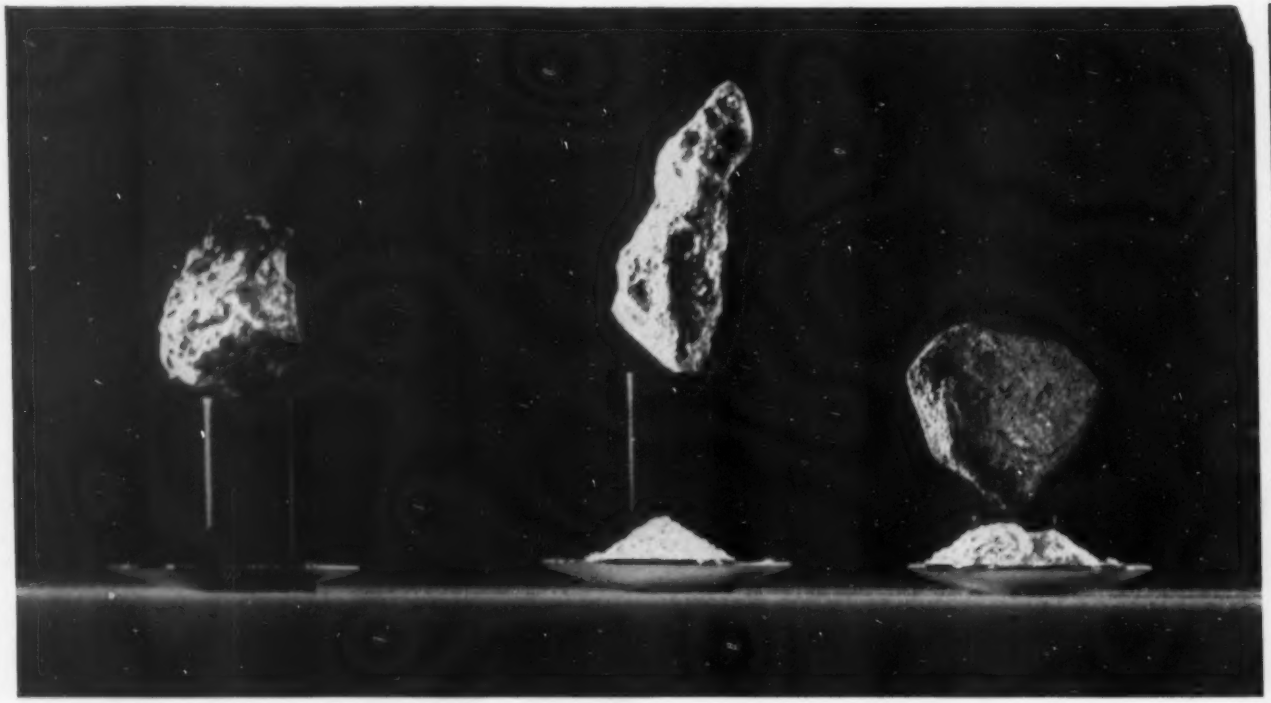


Separan 2610

SETTING ECONOMY RECORDS

Amazing speed establishes Dow flocculant as a new tool for the mining industry

IN PROCESS AFTER PROCESS—Separan 2610® is saving time and money in settling and filtration operations throughout the mining industry. In many cases, the speed of Separan 2610 has doubled, even tripled, production rates!

ECONOMICAL AND EASY TO USE—A little Separan 2610 goes a long way. Normally, a few hundredths of a pound per ton of solids yields optimum results. And it's as easy to prepare and apply as it is economical! Stock solutions require no heat or preservatives. A new disperser enables you to prepare large amounts of stock solution with a minimum of labor—a mechanical mixer is not required. In addition, this synthetic, organic polymer is effective in both acid and alkaline circuits; presents no hazard in normal use; and adds no excess bulk.

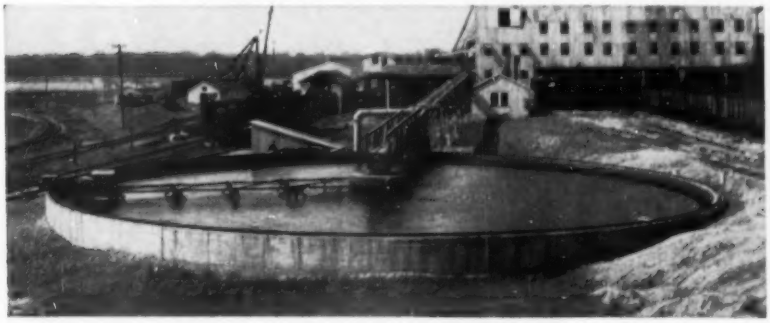
AVAILABLE WHERE NEEDED—Separan 2610 is available in convenient 50-lb. bags from supply points at Midland, Michigan; Pittsburg, California; and Newark, New Jersey.

Mail the coupon, today, for details that relate Separan 2610 more closely to your application. We would be pleased to send a sample and provide technical assistance whenever a settling or filtration problem confronts you.

Visit Dow Booth #339 at the American Mining Congress, Oct. 1-4, 1956.

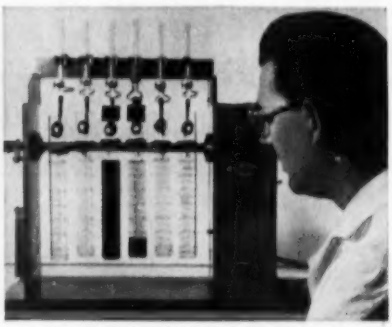
Improving operations for a wide variety of materials

Copper, gypsum, uranium, lead, coal, pyrite, alum, cement, foundry sand, iron ore, rare earths, barium, magnesia, zinc, clay, borax, potash, soda ash, nickel, gold, lithium, manganese, petroleum wastes, pulp and paper, industrial wastes and mill tails—these are some of the applications for Separan 2610, and the list is ever increasing!



IN COAL WASHING OPERATIONS, 6¢ worth per ton of slimes permits closer control of solids, helps minimize ash content and prevent plugged lines, stream pollution. A large copper processor reports clearer overheads, improved filtration by adding 0.01 to 0.04 lb. Separan 2610 per ton of solids.

URANIUM—One processor eliminated 4 of 5 thickeners, saved up to $3000 a day. Another obtained a five-fold improvement in filtration rate with proper addition of 0.12 lb. Separan 2610 per ton of ore. *An iron-ore processor* uses 0.008 lb. per ton to recover water from mill tails.



DOW XANTHATES AND DOWFROTH® 250 are other important members of the Dow family of preferred mineral-recovery chemicals. In floating sulfides, Dow Xanthates are first choice for their wide range of selectivity and Dowfroth 250 for its livelier froth and low consumption rate.

THE DOW CHEMICAL COMPANY, Technical Service & Development, Midland, Michigan, Dept. SC 927D.

Please send sample and data on Separan 2610.

I need a flocculating agent for _____

Name _____

Title _____

Company _____

Street _____

City _____ State _____

DOW

you can depend on DOW CHEMICALS

Idaho Mine Reports Superior Blasting with Du Pont Dynamite, Delay Caps

1. LOADERS distribute Du Pont Delay Electric Blasting Caps in 42-hole drift round prior to loading at the Crescent Mine of the Bunker Hill Co. at Kellogg, Idaho.

2. FACE ready for shot. Load is Du Pont "Gelex" #1 (1¼ x 8), primed with Du Pont MS and regular Delay Caps—a winning combination for effective blasting.

3. BLASTER fires the shot with a Du Pont CD-32 Blasting Machine. This lightweight machine eliminates the necessity of maintaining permanent firing lines . . . yet can fire up to 480 caps in parallel series.

4. RESULT of the blast—excellent breakage, which speeds loading. Good fumes of "Gelex" get the scalers and muckers back quickly. Try the dependable line of Du Pont mining products in your operations!

You can enjoy the same excellent fragmentation and on-schedule operations by using Du Pont Explosive and Blasting Supplies in your mine. Your Du Pont representative will be glad to go into further detail. E. I. du Pont de Nemours & Co. (Inc.), Explosives Department, Wilmington 98, Delaware.

DU PONT EXPLOSIVES

Blasting Supplies and Accessories

DU PONT

REG. U. S. PAT. OFF.

BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

outside

high-pressure and high-temperature molding for extra

LAMINATED PROTECTION

Laminated construction means M-S-A Skullgard protection is built-in, layer by layer. More than 6 different materials, blended to provide maximum strength without excessive weight, are used. This method of exactly positioning the reinforcing pieces for maximum safeguard led to the development of the M-S-A "Danger Zone" protection. But that's only part of the protection story. To make sure these material layers are *permanently welded*, more than 2000 pounds of pressure, and carefully controlled heat, are used in our molding process. The result is a one-piece, smooth, laminated shell that gives workers an extra margin of safety.

inside

...quality design and material selection for added

SAFETY-COMFORT

M-S-A Skullgard suspensions are designed to provide maximum protection, better distribution of impact. Crown straps are of high quality material selected for strength, comfort and durability. The entire suspension assemblies are tailored for top comfort. Available in Snap-in Adjustable type, Standard Sized Laced type, and Adjustable Laced type.

with M-S-A® SKULLGARDS

Small wonder M-S-A Skullgards are turning head accidents into incidents in a variety of industries. Tough, rugged, *laminated* shell construction dissipates the force of impact—engineered suspensions cushion the blow, permit non-slipping adjustment that means accurate fit. And comfort qualities encourage full-time hat use. Our bulletin gives complete details. Write for your copy.

The complete line of head protection available from M-S-A also includes Glass Fiber Hats in eight stock colors, and Aluminum Hats and Caps.

MSA

SAFETY EQUIPMENT HEADQUARTERS

When you have a safety problem, M-S-A is at your service
Our job is to help you

MINE SAFETY APPLIANCES CO.

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At Your Service: 76 Branch Offices in the United States

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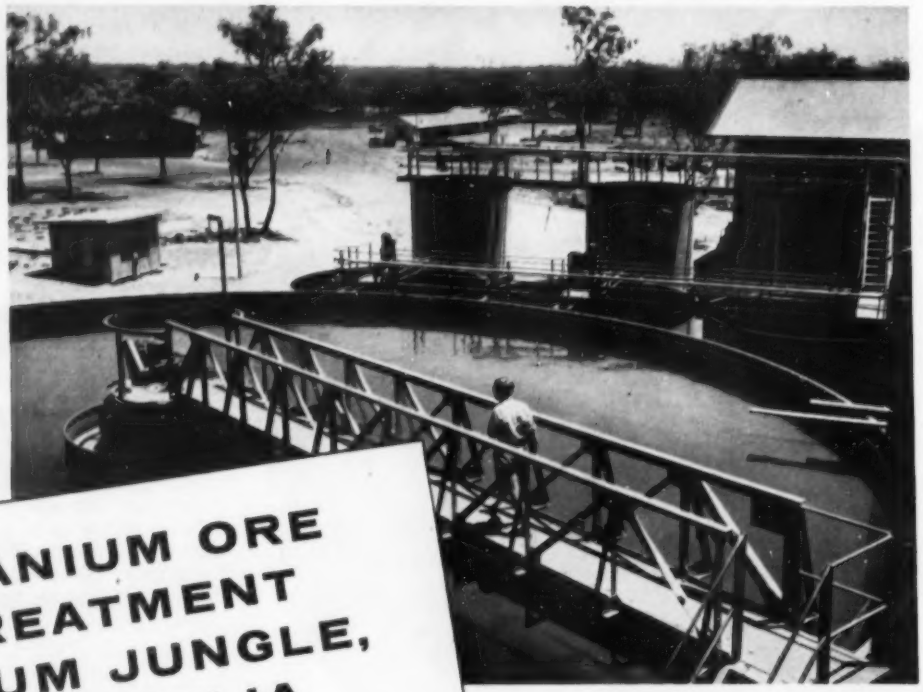
Cable Address: "MINSAF" Pittsburgh

General view of Rum Jungle Installation.

Close-up of 65′ dia. Dorr Torq Thickener (Type S).



URANIUM ORE TREATMENT at RUM JUNGLE, AUSTRALIA

Photographs courtesy of Australian News & Information Bureau.

Way down under — 54 miles south of Darwin, Australia, the Rum Jungle Uranium Project selected Dorr-Oliver equipment for uranium processing from our manufacturing representatives in Australia. Late in 1954, the plant began extracting uranium oxide from one of the world's major deposits of uranium bearing ore.

In the *dressing plant* a 65′ dia. Dorr Thickener dewaters the pulp to 50-55% solids which is then pumped to the leaching system. In the *leaching system* two 11′ 6″ x 12′ Oliver Filters perform a liquid-solids separation on the leached uranium ore. In the *uranium recovery section* the precipitated uranium values are thickened by three 20′ dia. Dorr Thickeners.

For more information on the complete line of D-O equipment for the mining industry, write to Dorr-Oliver, Stamford, Connecticut.

DORR-OLIVER
INCORPORATED
WORLD-WIDE RESEARCH • ENGINEERING • EQUIPMENT
STAMFORD • CONNECTICUT • U.S.A.

AT THIS FAMOUS MINING SITE—
"PLENTY OF RELIABLE POWER"

This is the site of the "Bridal Chamber," where a solid chunk of nearly pure silver weighing an estimated six million ounces was discovered in the late nineteenth century. There is now a manganese mine and mill on the site at Lake Valley, New Mexico.

Two Caterpillar D13000s run 16 hours a day, providing all pneumatic power through Gardner-Denver compressors. The CAT* Diesels have needed no repairs. A third Cat, a D13000 Electric Set, supplies electric power for the manganese mill.

"Our three Caterpillar D13000 Engines supply our mining and milling operations with plenty of reliable power," says the mill superintendent for Haile Mines, Inc., of Hillsboro, N. M.

Now you can get the new Caterpillar D342, which replaces the D13000 in the Caterpillar line. Capable of 210 HP (maximum output capacity), the four-cycle D342 Diesel is built to do more work at lower cost with less down time than any other engine in its class. Like all other Caterpillar Engines, the D342 has such long-life features as "Hi-Electro" hardened crankshaft journals and cylinder liners, foul-free fuel injection, aluminum alloy bearings, and highly effective filters and seals to protect its built-in Caterpillar precision.

There is a full line of Caterpillar Diesels, up to 650 HP (maximum output capacity). Your Caterpillar Dealer will help you select the Cat Engine or Electric Set that's "tailor made" to do most work for you at lowest cost. Ask him for full facts and figures soon. And count on him whenever you need skilled service and parts you can trust.

Caterpillar Tractor Co., San Francisco, Calif.; Peoria, Ill., U.S.A.

CATERPILLAR*

*Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

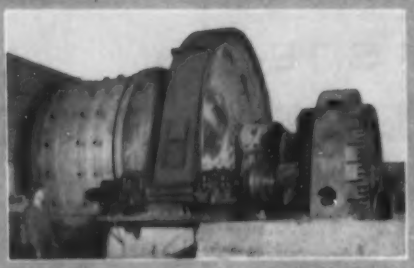
MODERN
HEAVY-DUTY POWER

Marcy

EXPERIENCE...

your best assurance of economical operation

Nothing can take the place of EXPERIENCE...and Mine and Smelter has specialized in the design and manufacture of grinding mills for more than forty years. This experience in design, materials and construction is your assurance of getting long, economical service out of Marcy Mills.



Direct connected drive with flexible coupling

V-belt drive.

Speed reducer drive.

for example...

DRIVES AND GEARS

- the types of drive and gears used are custom-engineered for each Marcy Mill to assure dependable, continuous operation and long, trouble-free operation...one of the many Marcy Mill features which result in low-cost-per-ton production.

- **drives may be**

  direct connected with flexible coupling using cut tooth single helical or herringbone steel gears.

  V-belt or speed reducer drive with meehanite cut tooth spur gears.

  variable speed drives for special applications.

- single helical and herringbone gears are made to American Gear Manufacturers Association recommendations as to tooth shape, size, material specifications, etc., assuring long life and efficiency. This, combined with precision gear cutting, provides an extra high service factor.

*BOTH MARCY AND MASSCO ARE REGISTERED TRADEMARKS.

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The Mine & Smelter Supply Co.
Denver 17, Colorado

OFFICES IN SALT LAKE CITY, EL PASO, 1775 BROADWAY, N. Y. C.

Gardner-Denver . . . Serving the World's Basic Industries

A load lugger in any slusher drift

Full loads—five-cylinder radial air motor provides high starting torque that digs scraper into muck pile for a full load every trip.

Fast loads—powerful air motor develops top power and speed in either direction . . . assures a fast trip and a quick return.

Finger-tip control—a single throttle lever controls the complete operation.

Fully enclosed—all working parts completely protected against water, dust or grit.

Simple, rugged construction. Compact design for moving through small raises or chutes.

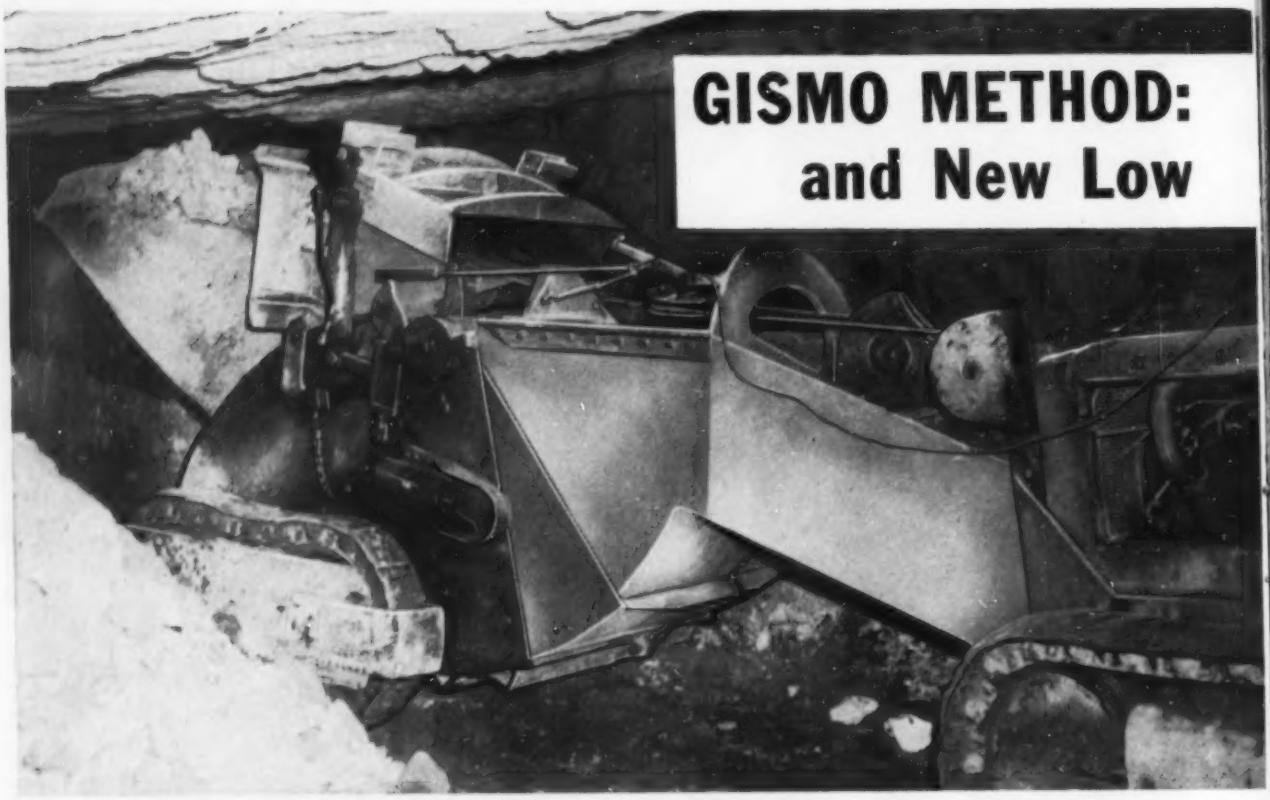
Bulletin AS-3 gives full details. Send for your copy today.

GARDNER - DENVER

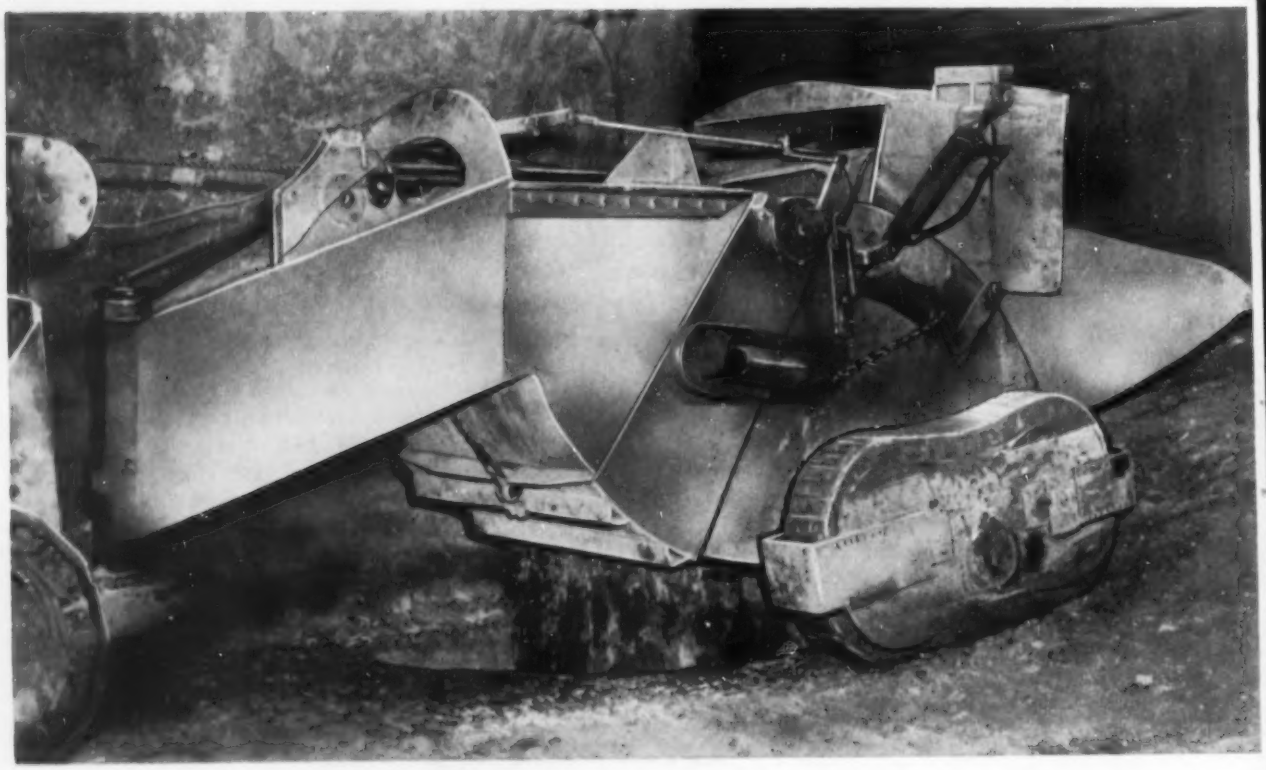
THE QUALITY LEADER IN COMPRESSORS, PUMPS, ROCK DRILLS AND AIR TOOLS FOR CONSTRUCTION, MINING, PETROLEUM AND GENERAL INDUSTRY

Gardner-Denver Company, Quincy, Illinois
Export Division: 233 Broadway, New York 7, N.Y., U.S.A.

GISMO METHOD: and New Low



LOADS AND TRANSPORTS up to 100 tons per hour with a 300 ft. haul. Gismo loading mechanism is mounted integral with a 6-ton capacity body and an operator controlled dumping device. Above you see Gismo mucking and below dumping at a uranium mine installation. There is no crash or "slam bang" loading. Dipper edge is crowded into the muck pile slowly, similar to methods employed by an experienced hand shoveler.



A Master Plan for Record Tonnages Cost of Developing and Producing!

THIS MASTER PLAN eliminates the need for synchronization between the various phases of mining. Drilling, blasting, loading, hauling and hoisting are kept independent of each other. Delays in any one phase do not set up a chain reaction and result in delays in any or all other phases. Maximum efficiency is assured.

You are going to like the Gismo Method also because it requires few machines, few men, less planning and integration.

Your men are going to like the equipment and the flexibility of its operation. The Gismo itself is a general purpose utility self-loading transport. It is simple, versatile and built to take the punishment of rock excavation. No special development facilities or conditions are usually required. It operates in sloping ore bodies with irregular outlines, as well as large or relatively small openings. It's an unusually simple piece of equipment requiring little maintenance. Its initial cost can be reasonably compared with one year's maintenance cost alone of much of the conventional equipment in present use.

YOU USE SAME EQUIPMENT FOR DEVELOPMENT AND PRODUCTION: A Gismo Drilling Jumbo, a Gismo Self-Loading Transport, a tractor, an incline ramp, any required number of S-D Automatic Bottom Dumping Ramp Cars, a locomotive and track. In production the cars and locomotive are used to transport the ore from surge pocket.

We urge you to investigate the Gismo System and its Master Plan for record tonnages and low cost development and production. We encourage you to compare it with all other methods—involving new or old equipment. It is our opinion that once you make direct comparisons you will recognize that any system without the Gismo Method's Master Plan is obsolete. Write us today for complete information. *Sanford-Day Iron Works, Inc., Knoxville, Tenn.*

IMPORTANCE OF THE GISMO STOPE DRILLING JUMBO cannot be overlooked. Since it heads up the mine ore extraction process, high-speed drilling and blasting made possible by the Gismo Jumbo is necessary to keep enough rounds available for the Gismo Self-Loader.

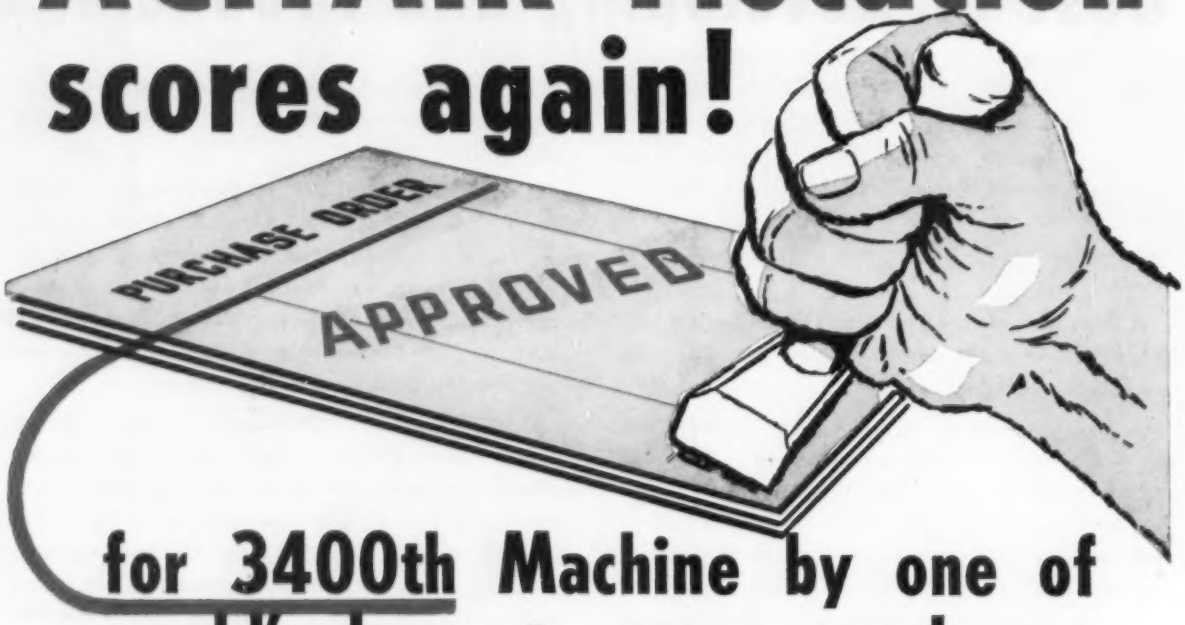
TREMENDOUS ECONOMY results from loading directly into S-D Automatic Ramp Cars in tunnel work. In production some cars are used to haul ore from surge pockets. Some of you must be thinking you are reading fantastic ideas, figures and statements. All are very true, real and conservative.

SANFORD-DAY

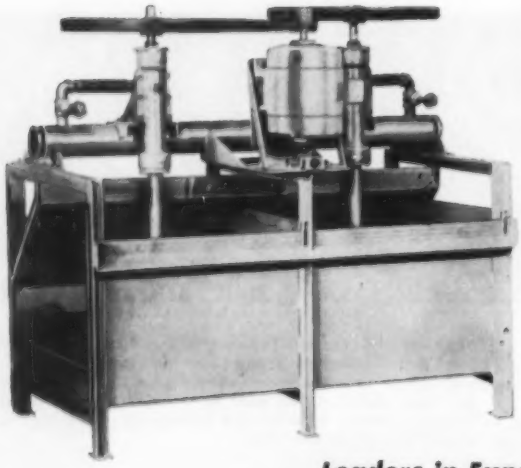
"SUPER MARKET FOR MINE CARS" — *all types* * PRECISION WHEELS * "BROWNIE" HOISTS, CAR RETARDERS, SPOTTERS, PUMPS AND OIL SPRAY SYSTEMS * GISMO SELF-LOADING TRANSPORT that loads *(mucks)* in development or production . . . transports . . . supports 2 to 5 jib mounted drills . . . back fills . . . moves boulder rocks . . . makes its own roadways and cleans up completely — a new method of hard rock mining offering a tremendous reduction in cost per ton!

5161

AGITAIR® Flotation scores again!



for 3400th Machine by one of world's largest copper producers



It's an impressive tribute to AGITAIR® when one of the largest copper producers rounds out its 19th year of continuous use of this world-famed Flotation Machine. Naturally, performance demands have been high and the many reorders substantiates continued satisfaction.

Again, AGITAIR® success is based on these proven advantages: high rate of recovery; low power consumption; rubber covered parts to prevent costly wear; rugged construction; and the facility of making repairs without halting production.

Write for free literature that describes and illustrates in detail the unique features of AGITAIR® that give it such outstanding world leadership in ore recovery.

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METALLURGICAL DIVISION · ENGINEERING SERVICE

CONSULTATION • ORE TESTING • PLANT DESIGN

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GALIGHER PRODUCTS: AGITAIR® Flotation Machine, VACSEAL Pump, Geary-Jennings Sampler, Acid-proof Sump Pump, Geary Reagent Feeder, GAL-CLONES, Laboratory AGITAIR® Flotation Machine, Laboratory Pressure Filter, Laboratory Ball Mill, Rubber Lined and Covered Products, Plastic Fabrication.

Loading from hopper, C Tournapulls carry 18 tons per load. Average loading time was 26 seconds . . . 1.6-mile cycle was completed in 9 minutes.

"Twice as much material . . . twice the distance . . . at half the cost"

New 18-yd. FULLPAK: All-new lower, wider C Fullpak Scraper loads faster, easier . . . hauls even more heaped pay-yards than rigs shown in this job report. New Fullpak design packs load in corners, gives live boiling action that heaps 18-yd. pay-loads fast for greater yards-per-hour dirt-moving profits!

That's how Peter Debaldo, of Debaldo Bros., Glenshaw, Pennsylvania, compares his C Tournapulls to trucks on the removal of "boney" waste material at a progressive coal mine in Hammarville, Pa. After the waste material is separated from the coal it is carried by conveyor to a hopper for loading. Here's how 2 rubber-tired C Tournapulls speed this disposal.

18 tons per load

Each "C" drives beneath hopper-bin where "boney" material is stored. Operator gets out and pulls hopper-lever, loading about 18 tons into scraper-bowl. After loading, "C" hauls about 0.8 mile to waste-dump area, where it spreads the "boney". Haul, which is up grades to 13%, is dusty during summer months . . . muddy and slick at other times.

2000 tons daily

The "C's" haul and dump about 2000 tons of waste material daily. Because of their speed and versatility, cycle time (including 26 seconds to load) averages only about 9 minutes on the 1.6-mile trip.

With coal mining operations on a 24-hour day basis, the "C's" are kept busy loading and hauling most of the time. The only time Tournapulls are idle is when waste material is removed from bins faster than mine can supply it.

Likes "C's" performance

Owner Debaldo said, *"No other machine can compare to the 'C' in hauling the amount we do over these haul roads."* Chief Mechanic Chester Aber added, "These 'C's' are the easiest machines to maintain."

Why not find out how the versatile "C" can save time and money for you? Ask us now about the new, bigger, 18-cubic-yard C Fullpak Scraper, too. It's an even better dirtmover! We'll be glad to give you facts and figures on these high-production rigs any time.

Adams 440 motor grader maintains mine haul road. Despite heavy muck, which made road slick, the 440 kept roads smooth and level.

Spreading on the run, C Tournapull dumps 18 tons of "boney" material in smooth layer at waste-dump in a matter of seconds.

Fullpak—Trademark, Tournapull—Trademark Reg. U.S. Pat. Off.

P-996-M-b

LeTourneau-WESTINGHOUSE Company

Peoria, Illinois

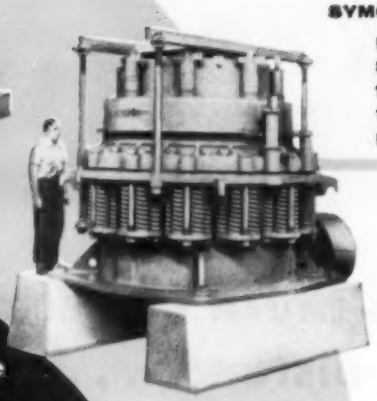
A Subsidiary of Westinghouse Air Brake Company

SYMONS® PRIMARY GYRATORY CRUSHERS

Built in 30", 42", 54", 60" and 72" sizes, for capacities up to 3500 or more tons per hour.

SYMONS CONE CRUSHERS

Built in both Standard and Short Head types, in sizes from 22" to 7', in capacities from 6 to 900 or more tons per hour.



NORDBERG MACHINERY

for URANIUM PRODUCTION

keeps pace with the Atomic Age

URANIUM—the Wonder Metal of the Atomic Age—is today one of the most sought after elements in the earth's crust. And with good reason when you consider that one pound of pure Uranium will produce by fission as much energy as the combustion of 20,000,000 pounds of coal. This powerful new servant serves mankind in many ways and each day its benefits grow increasingly greater.

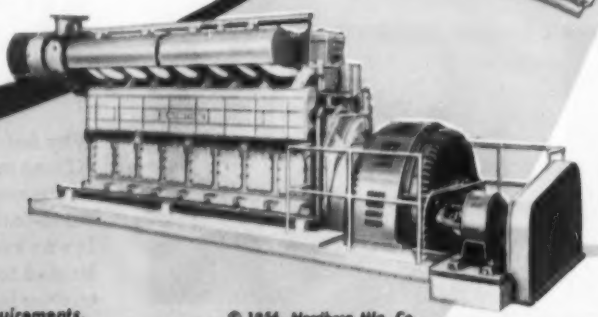
Increasing too is the role being played by Nordberg Machinery in the efficient processing required for production of this valuable metal. From the Congo and South Africa to the ore bodies of the United States and Canada, leading producers are installing Symons Gyratory Crushers for primary breaking, Symons Cone Crushers for finer reduction, Symons Grizzlies and Screens for scalping and sizing, and Nordberg engines for mine and mill power.

SYMONS VIBRATING BAR GRIZZLIES

Built for heavy duty large capacity scalping service. Particularly effective when handling wet, sticky or gummy ores. Will handle feeds up to 30" and larger.

SYMONS ROD DECK SCREENS

Highly efficient, big capacity units adaptable to mill feed screening and for handling heavy feeds of wet, sticky ores.



NORDBERG ENGINES

Built in a wide range of sizes from 10 to over 12,000 horsepower, including Diesel, Duafuel® and Spark-Ignition Gas types for low cost power generation.

Write for information on your machinery requirements.

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Milwaukee, Wisconsin

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MACHINERY FOR PROCESSING ORES and INDUSTRIAL MINERALS

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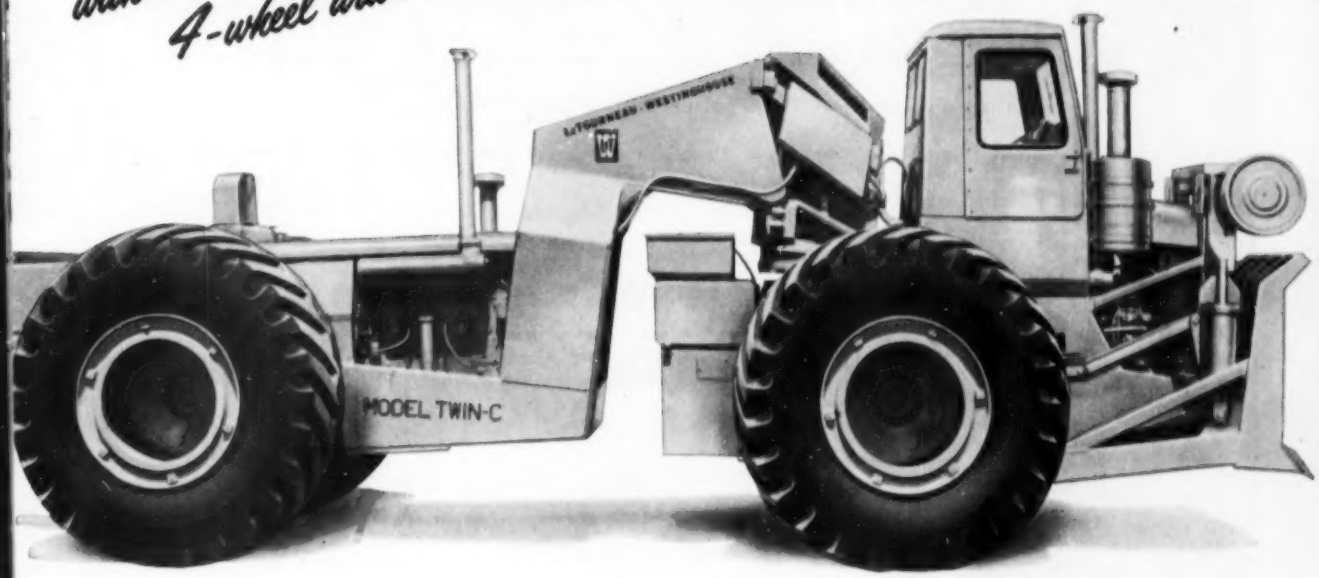
TORONTO • MEXICO, D.F. • LONDON •, JOHANNESBURG

Now... world's MOST POWERFUL and FASTEST push tractor...

with 416 HP and 4-wheel drive

The Twin-C Pusher



...to give you bigger loads in shorter loading time

One operator and this powerful "Twin-C" pushes your biggest production scrapers for capacity yardage. On many jobs it will do this in less time than it takes 2 crawler-pushers with 2 operators. Rubber-tired speed, and articulated steer, give quick maneuverability for direct-line push, save seconds in picking up next load.

Synchronized power matches speeds of earthmovers — Twin-C speeds match loading speeds of modern rubber-tired earthmovers, take advantage of combined power of loader and pusher to get big pay loads *fast*. Torque converter, teamed with constant-mesh transmission in both front and rear engines, reduce "lug downs" and gear changes necessary in many pushers.

More usable power with rubber pushing rubber — You get greater usable horsepower and coordinated pushing force when you push rubber with rubber. You get full floating traction... tire treads follow tire treads... no loss of power to flatten out rounded tire-tracks into flat track-tracks. And Twin-C's 80,000 lbs. weight rides on four big 29.5 x 29 tires with 22-ply rating; each 2'5" wide for firm ground-gripping traction on any type of surface.

Additional Twin-C advantages:

- Forward speeds to 20 mph and fast reverse, plus "articulated" steer, enable Twin C to position faster behind scrapers.
- Big 49½ x 88" heavy, concave push-bowl is positioned by an electric motor to take full advantage of contact area provided by scraper push-block.
- Push-button electric controls with instant response, the same type controls used on LeTourneau-Westinghouse scrapers for 8 years, give you positive power-steer and accurate push-plate-positioning.
- Power-transfer differentials on both engines match pull to traction, automatically apply power to wheels on firmest footing. Keep big pay-loads rolling in sand, mud, and loose materials.

If your fleet includes production scrapers, you will want more information on the Twin-C Pusher. Ask your LeTourneau-Westinghouse Distributor for full details.

65,900 lbs. Drawbar Pull! Powerful 416 hp Twin-C Pusher push-loads scraper fast. In recent Dynamometer tests, Twin-C, operating in sandy clay footing, registered drawbar pull of 65,900 lbs. in low-speed range.

Twin-C—Trademark TW-1039-G-b

LeTourneau-WESTINGHOUSE Company

Peoria, Illinois

A Subsidiary of Westinghouse Air Brake Company

A Vital Segment of the Carpco Group

Carpco

RESEARCH AND ENGINEERING

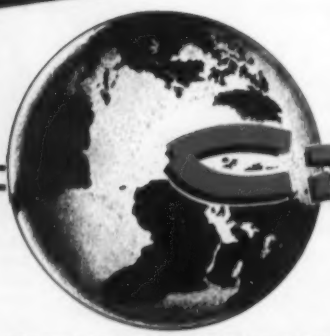
Carpco Research and Engineering is the "question and answer" division of the Carpco Group of closely integrated engineering and manufacturing units. Carpco Research and Engineering offers you these facilities for difficult and unusual ore dressing problems:

Complete laboratories using modern separation techniques, specializing in specific gravity, high tension, and magnetic separations.

Pilot Plant, fully equipped to carry out full scale tests for preparation of flow sheets for plant design.

Plant design and construction are important parts of Carpco service. Our engineers from the four corners of the earth are available for consultation and recommendations.

From the smallest detail to complete packaged plants . . . *it's Carpco all over the world!*



Carpco

CARPCO RESEARCH AND ENGINEERING • CARPCO MANUFACTURING, INC.
CARPCO CONSTRUCTION CORPORATION • CARPCO EXPORT CORPORATION
JACKSONVILLE, FLORIDA, U.S.A.

Much of the material to be moved is trap rock, one of the hardest stones in New England. Three-layer, all-steel, grid-type bowl with tool-steel floor resists shocks of loading. Big, wide bowl opening with low rear entry, is an easy target for this 2-yard shovel.

"Maneuverable . . . that's why we bought it," says contractor

Angelo Tomasso, Inc. hauls 1,200 tons of hard trap rock per day to a crusher in their quarry at New Britain, Connecticut. To an equipment fleet at this quarry that included a 2-yard shovel, a 15-ton Rear-Dump, and a 9-ton dump-truck, the company added a 22-ton C Tournapull Rear-Dump.

"We bought this machine in anticipation of working on a shelf. It is very narrow up there and we need to maneuver around...one false move and the machine would drop 90 feet," says A. Tomasso, Jr.

Maneuver safely on narrow roads

Tomasso and his crew soon found that Tournapull Rear-Dumps are well equipped to work safely on narrow shelves such as those encountered on this job.

Power steer makes the Tournapull easy and quick to maneuver. Prime-mover can turn 90° right or left for getting around in tight quarters.

In any emergency, Tournapulls' four-wheel multi-disc air brakes (with more braking surface on one wheel than most haulers have on all four) provide an extra bonus of safety. You can always depend on the Tournapull to stop instantly. Low center of gravity, good visibility, and front-wheel drive also contribute to Tournapulls' safety.

In the Tomasso quarry, rock crusher was located about 700 feet down 5% grade from the loading shovel. Rear-Dumps, hauling 18 tons of shot trap rock, traveled over the crushed rock haul-road in third gear, at speeds up to 11½ mph.

Comments Operator Albert Buchiere, "Trucks can't even get close to these machines. I've run about every type of haul unit there is and these 'Pulls are the best."

Cut lubrication time

Not only did the Tournapulls save time and money on hauling, but, according to Mr. Tomasso, it takes only ⅓ as long to lubricate the C Rear-Dump as it does to lubricate an ordinary dump-truck.

If you have hauling to do, over narrow roads or in close quarters, you will want more information on Tournapull Rear-Dumps' high production. Available in 11, 22, and 35-ton capacities, a size to fit your requirements. Write for full details.

After one of New England's disastrous hurricane-floods, this Tournapull Rear-Dump took Civil Defense officials on a survey of damage in the area. It was the only unit in the area that could safely drive through the high water. Tournapull also helped to haul 270,000 yards of borrow and gravel over average 3½-mile distances to replace 4½ miles of the road, between Unionville and Collinsville, Connecticut.

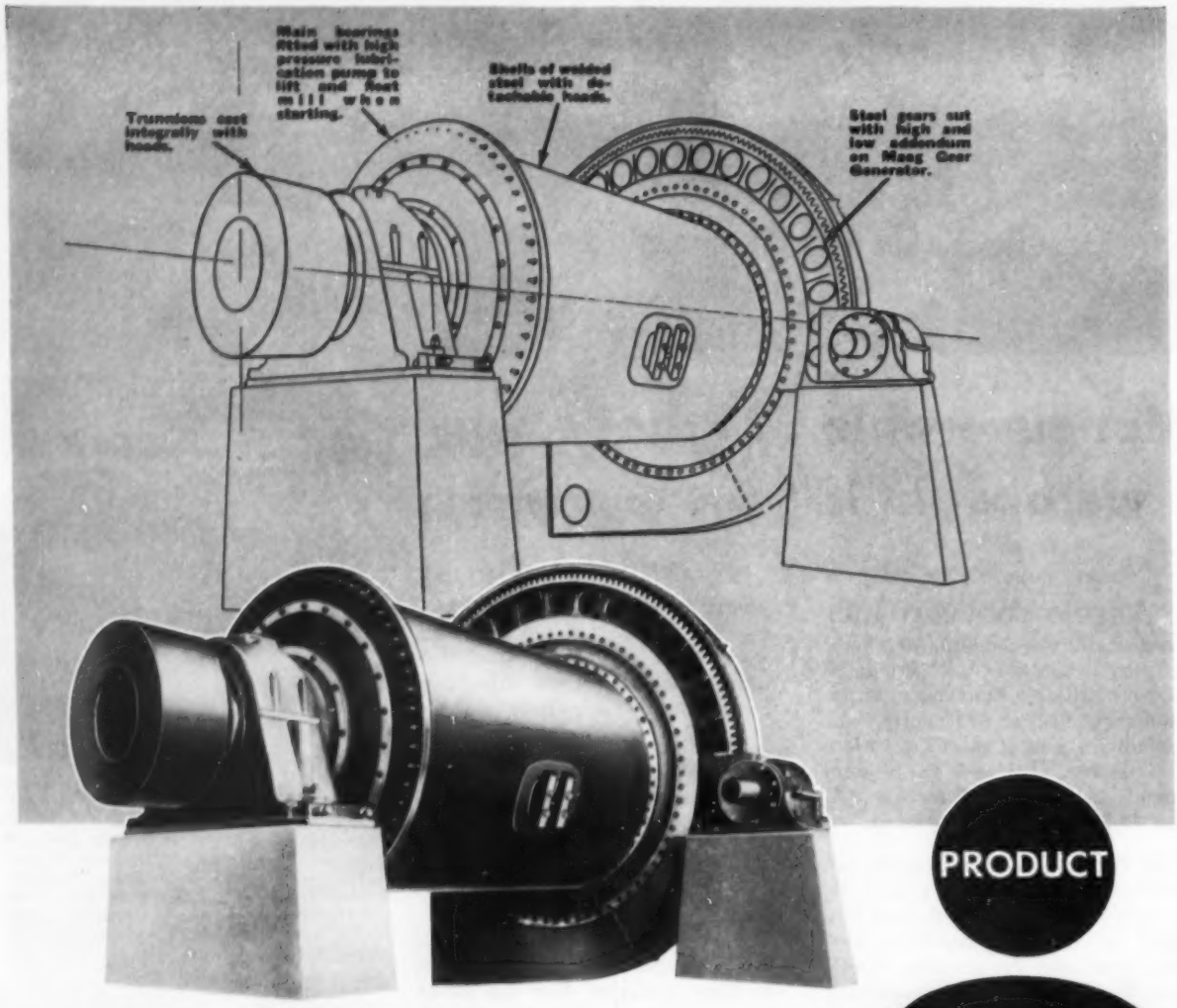
When job report was taken, Tournapull was dumping into a 42 x 40-inch hopper. A flick of a switch activates hoist motor. Body lifts quickly, swings behind rear wheels to dump clean over bank, or into grizzly. Streamlined bowl sheds material readily. Body can also be held in any desired position for spreading on the run.

Tournapull—Trademark Reg. U.S. Pat. Off. R-966-Q-b

LeTourneau-WESTINGHOUSE Company, PEORIA, ILLINOIS

A Subsidiary of Westinghouse Air Brake Company

For over a half-century Traylor Grinding Mills have been regarded as the accepted standards of grinding mill design.


Main bearings fitted with high pressure lubrication pump to lift and float mill when starting.
Shells of welded steel with detachable heads.
Trunnions cast integrally with heads.
Steel gears cut with high and low addendum on Maag Gear Generator.

Traylor Grinding Mills Improve All 3

PRODUCT

PRODUCTION

PROFITS

Leading producers rely on the many proven features of Traylor Grinding Mills to assure them more efficient production with added production economies.

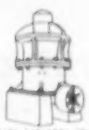
Available in sizes to meet practically every requirement. Traylor Grinding Mills are offered in a wide variety of types including: Rod, Compartment, Ball, and Tube Mills for wet or dry . . . coarse or fine grinding.

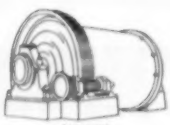
TRAYLOR ENGINEERING & MFG. CO.
846 MILL STREET, ALLENTOWN, PA.
SALES OFFICES: New York • Chicago • San Francisco
Canadian Mfr.: Canadian Vickers, Ltd., Montreal, P.Q.

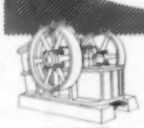
A **Traylor** Leads to Greater Profits

PRIMARY GYRATORY CRUSHERS

ROTARY KILNS


SECONDARY GYRATORY CRUSHERS


BALL MILLS


JAW CRUSHERS

APRON FEEDERS

To celebrate its first birthday

THE D9 GETS INCREASED HP

—more power for your operation!

320 HP
(FLYWHEEL)

formerly 286 HP

260 HP
(DRAWBAR)

formerly 230 HP

The giant Turbocharged CAT* D9 Tractor, which since its introduction last year has set new performance standards in the field, now packs more power than ever to handle even bigger jobs. Its drawbar capacity has been increased from 230 HP to 260 HP—its flywheel horsepower from 286 to 320!

This increase in power reflects Caterpillar's policy of leadership in action. Combining research with practical field experience, there's constant product improvement to meet your needs for bigger production at lower cost. This policy applies to *every* product in the Caterpillar line—Diesel Engines, Tractors, Motor Graders and Earthmoving Equipment.

Now, with its increased horsepower, you can give the D9 tougher jobs than ever before. To match your requirements, it's available with torque converter or direct drive with oil clutch. For complete details about the more powerful D9, see your Caterpillar Dealer. Name the date—he'll be glad to demonstrate!

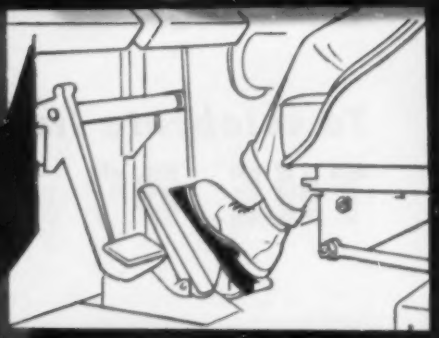
Caterpillar Tractor Co., San Francisco, Cal.; Peoria, Ill., U.S.A.

CATERPILLAR*

*Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

D9—MORE POWERFUL FOR BIGGER PRODUCTION

PUSH THIS PEDAL...



Payhauler® Bonus-

This new Model 95 Payhauler is carrying 24 tons of shovel-loaded limestone over the quarry floor, up the ramp to the crusher. A 4-speed torque converter transmission provides smooth speed changes and gives direct-drive performance through a lock-up clutch design. The Model 95 is also available with a 9 speed conventional transmission.

Try load-highballing turbo-charged diesel power in either the new 24-ton Model 95, or 18-ton Model 65 International Payhauler—with highest hp-per-ton of any similar-size off-highway trucks. Turbo-charging keeps cargo-power high, engine weight per hp low, cuts fuel costs 10%, or more—reduces upkeep.

Try the big-load-handling advantages of heat-defying, smooth-applying International Cerametallic clutch facings. No other clutch in any off-highway hauler gives such power-transfer efficiency, operating ease, or long life.

Try Payhauler "load-cradling", speed-gaining design! Semi-elliptic, multiple-leaf, free-floating springs swallow the "rock-shock" of big-shovel loading—and the mauling of 36 or 38 mph speeds. And brawny Payhaulers have the strongest main frames known of any off-highway haulers.

Try picture-window vision, ahead and to sides. Offset cab gives clear back-up view. Try changing speeds by *power-shifting*—steer with *power-steering*—dump with fast, responsive *power-hoisting*. You ride in "spring-hydraulic" cushioned seat comfort—fuel-up once daily! Try *new* Payhauler job efficiency! Have your International distributor give you a demonstration today!

Try new International® Powered performance

Try it..

Try a new Dirt-Heaping, Bid-Beating International Payscraper®. Overburden comes off fast when there's a high speed International Payscraper doing the stripping. A twenty-yard load takes less than a minute for the Model 75 Payscraper shown here with an International TD-24 push tractor. Compare payload-boosting Payscraper production to any other two- or four-wheel unit. See your International Construction Equipment Distributor for a demonstration today!

Try it..

Try new Bonus-Powered International crawler advantages! Try seconds-fast, true *in-seat* International gasoline conversion diesel starting—now standard equipment in all crawler models. Size-up the advantages of "control-tower" job vision—new booster steering ease—new Cerametallic clutching ease and efficiency—new 480-hour lube oil filters. Prove how bonus-powered performance boosts production, simplifies servicing! Try one, on your job.

TRY IT ON YOUR JOB!

See you at the **ROAD SHOW, CHICAGO**
Jan. 28 - Feb. 2, 1957

INTERNATIONAL HARVESTER

INTERNATIONAL® Construction Equipment

International Harvester Company, 180 N. Michigan Avenue, Chicago 1, Illinois

A COMPLETE POWER PACKAGE INCLUDING: Crawler, Wheel, and Pipe-Boom Tractors . . . Self-Propelled Scrapers and Bottom-Dumps . . . Tractor and Rubber-Tired Loaders . . . Diesel and Carbureted Engines . . . Motor Trucks

Built Big for Big Hauls

EXTRA RUGGED FOR ALL EARTH AND ORE MOVING JOBS

These rugged movers are built big *all over!* Ton for ton, Kenworth end-dump trucks have greater strength for longer life and less maintenance. Engineered for more driver comfort, safety and control, these production builders are spring mounted—supply unsurpassed visibility and dime-sized turning radius. Extra rugged, their variable section frames are designed to provide deepest sections at points of greatest loading stress. Front axles are just plain big—you can't bend them! Kenworth designed, full floating rear axles are over-sized too.

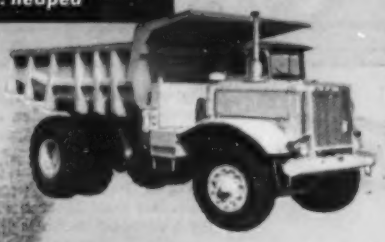
Built to last—their reinforced, all-welded, box-section-ribbed steel dump bodies hold up in service. Twin, fast-acting telescopic hoists, in combination with load equalizers, provide positive stability. Stem to stern, Kenworth builds 'em big—to deliver maximum performance on the toughest jobs!

KENWORTH 801
12 cu. yds. struck—
14 cu. yds. heaped

18-TON

KENWORTH 802
16 cu. yds. struck—
19 cu. yds. heaped

24-TON



KENWORTH 802B
32 cu. yds. struck

48-TON

KENWORTH 803
24 cu. yds. struck—
28 cu. yds. heaped

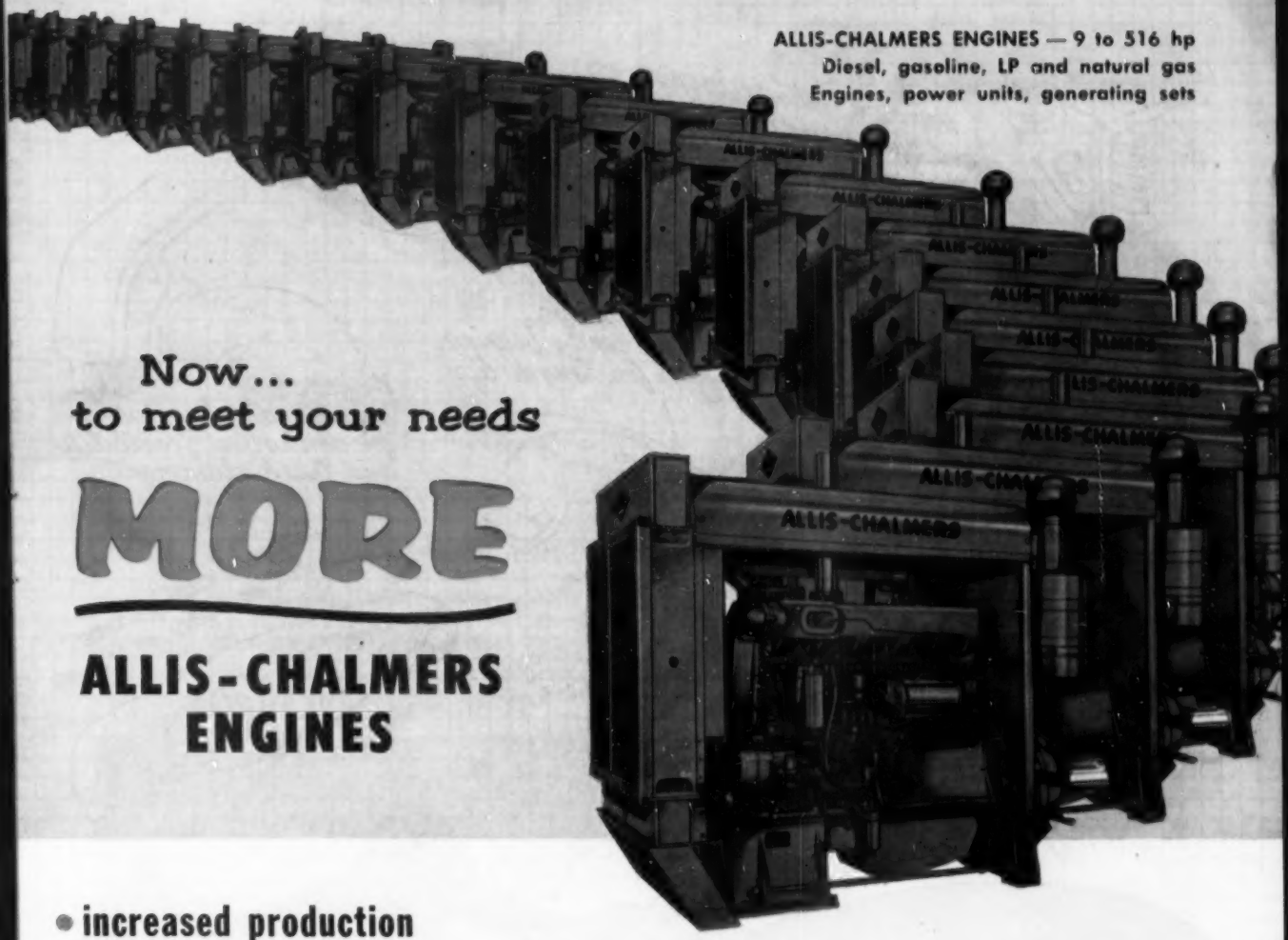
36-TON

KENWORTH

TRUCKS ★ BUSES

FACTORY AND HOME OFFICE: SEATTLE, U. S. A., DISTRIBUTORS IN THE UNITED STATES AND MOST FOREIGN COUNTRIES

ALLIS-CHALMERS ENGINES — 9 to 516 hp
Diesel, gasoline, LP and natural gas
Engines, power units, generating sets



Now... to meet your needs

MORE

ALLIS-CHALMERS ENGINES

- **increased production**
- **improved standards**
- **expanded service**
- **greater parts availability**
- **more parts interchangeability**

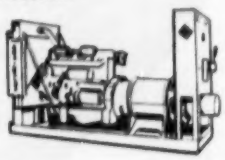
The production of Allis-Chalmers engines goes up, up, up to meet your needs. The 1956 production is expected to reach an all-time high — and 1955 output was many percent greater than 1954's. A multi-million-dollar expansion of facilities will further boost production.

But there are not only *more* engines to meet your needs, there are *better* engines — as Allis-Chalmers research and development continues to pioneer improvements, and as production and inspection standards are set even higher.

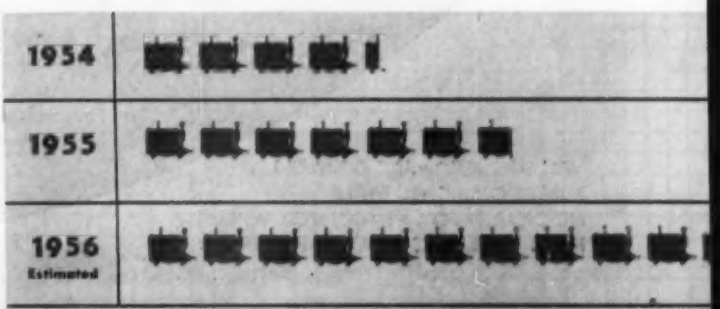
Along with this comes an expansion of customer service and greater parts availability, too, as sources of parts and service are moved closer to you.

More and more, it's Allis-Chalmers engines and service to meet your needs.

ALLIS-CHALMERS, BUDA DIVISION, MILWAUKEE 1, WISCONSIN



A complete line of improved engine generator sets from 5 to 300 kw, for emergency and continuous duty, for marine, cooling tower and industrial use.

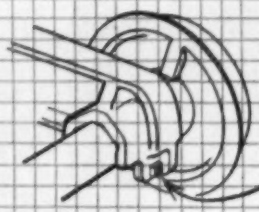


The 1956 production of Allis-Chalmers engines will reach an all-time high, with output many percent higher than in previous years.

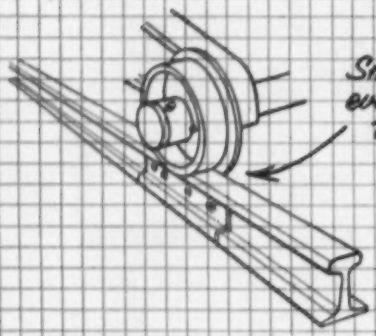
ALLIS-CHALMERS

BE-3

Movement between bolster and side frame is taken on specially designed wear surfaces

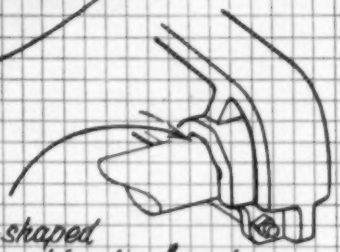


Quick wheel change



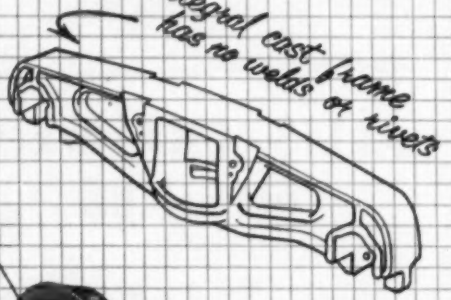
Smoother ride even on rough tracks

Large center bearing for longer life

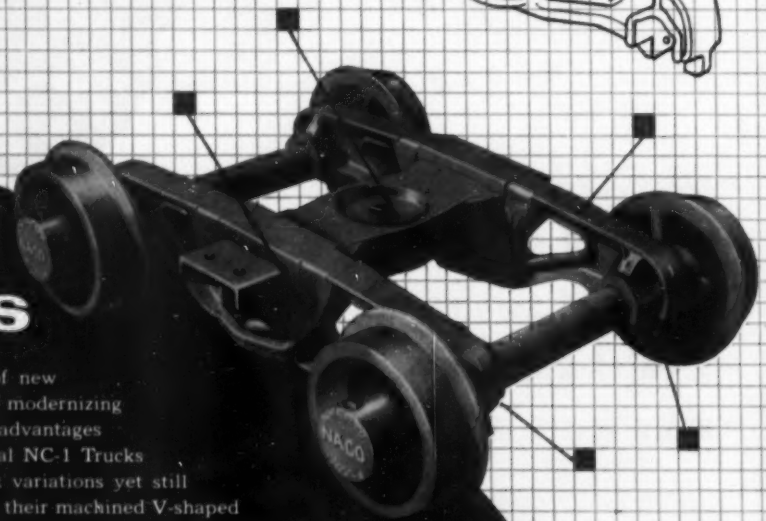


V-shaped machined axle grips for controlled flexibility and truck alignment

Integral cast frame has no welds or rivets



Check these "plus" features OF NATIONAL TRUCKS



If you're considering the purchase of new 8-wheel mine cars . . . or if you're thinking of modernizing older cars—*now* is the time to check the advantages of National NC-1 Trucks. National NC-1 Trucks have controlled flexibility for track variations yet still maintain truck alignment through their machined V-shaped axle grips. In addition, NC-1 Trucks have a built-in shock absorbing mechanism.

You get more out of your mine car investment per workshift . . . per day . . . per year. And at the same time you minimize spillage . . . get greater protection for your equipment, track and structures . . . slash maintenance to a new low.

Yes, *now* is the time to check National NC-1 Trucks—they make sense for 8-wheel mine cars . . . *make dollars for operators*, too.

AA 2931

- WILLISON AUTOMATIC COUPLERS
- RUBBER CUSHIONED UNITS
- NC-1 CAR TRUCKS • NACO STEEL WHEELS
- NACO STEEL LINKS & SWIVEL HITCHINGS

NATIONAL MALLEABLE and STEEL CASTINGS COMPANY

Cleveland 6, Ohio

BUILT FOR ROCK-HARD ROAD WORK

The Allis-Chalmers HD-21 is a Real Miner's Tractor

Chiseling an access road through rock demands "something extra" in crawler tractor performance and durability, yet it's the kind of job any miner's tractor may be required to do.

Conditions like this call for an Allis-Chalmers HD-21. Its 204-hp Allis-Chalmers engine is noted for its ability to perform with a minimum loss of efficiency even after thousands of hours of operation. Torque converter drive multiplies torque up to 4½ times . . . develops 41,500 lb drawbar pull at low speeds . . . cushions the entire power train against load shocks.

New Tru-Dimension tracks bring a new high in track durability. Thousand-hour lubrication intervals save maintenance time. Positive seals protect idler, support roller and truck wheel bearings from abrasive wear as no other seals can.

Ask your Allis-Chalmers dealer to show you the many other features that make the HD-21 a natural for rock-hard assignments.

ALLIS-CHALMERS, CONSTRUCTION MACHINERY DIVISION
MILWAUKEE 1, WISCONSIN

ALLIS-CHALMERS

Measuring rebuilt idler at Excavators Welding Co., Westbury, Long Island

REBUILD WORN PARTS TO EXACT SIZE

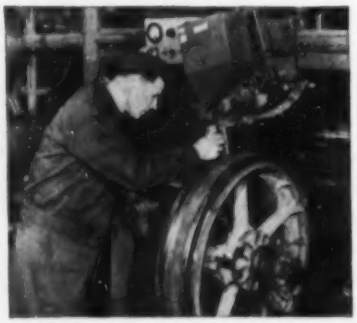
with Amsco® Automatic Welding

Rebuilt Track Rollers and Idlers give twice the life of original parts

Every day more contractors and service shops are finding the cost-saving answer to tractor parts replacement. It's the Amsco "550" Automatic Welder . . . plus Amsco AW-79 alloy steel electrodes.

The rugged Amsco "550" Welder is specially designed for this heavy-duty service. It rebuilds and hardsurfaces to exact size . . . at *half the cost* of replacement parts. And service life is normally *twice* that of the original part!

Ask your Amsco Distributor for full details on the "550" Automatic Welder and the full-line of Amsco Hardfacing Electrodes.



AMERICAN Brake Shoe COMPANY

AMSCO

American Manganese Steel Division • Chicago Heights, Ill.

OTHER PLANTS IN: DENVER, LOS ANGELES, NEW CASTLE, DEL., OAKLAND, CAL., ST. LOUIS; JOLIETTE, QUEBEC
Distributed in Canada by Canadian Liquid Air Co., Ltd.

Copper Mining in the Philippines with "Eucs"

Two Rear-Dump Euclids of 22-ton capacity deliver 6000 tons of ore per day to the crusher . . . six others haul overburden to waste areas.

The new Toledo Mine of Atlas Consolidated Mining & Development Corp. on the island of Cebu is the largest open pit copper mine in the Orient. First ore was delivered to the crusher in early 1955 and operations are now being expanded to more than double the original milling capacity.

Atlas selected 22-ton Rear-Dump Euclids to handle the bulk of the overburden and ore hauling. Two of them supply the mill with about 6,000 tons of ore per day, hauling an average of 1600 feet from the loading shovel. Six of the "Eucs" move overburden out of the pit to waste dumps from 1500 ft. to 1½ miles away.

With 300 h.p. diesel engines and Torqmatic Drives, these big Rear-Dumps have plenty of power to move capacity loads over steep grades and tough haul roads. They've kept hauling costs below original estimates and have proved their workability so well that the company is adding eight more 22-ton "Eucs" to the original fleet.

Dependable performance and simple, rugged construction are mighty important considerations when choosing haulage equipment for remote locations like this mine in the Philippines. Excessive down time would seriously curtail production—or even result in a complete shutdown of operations. Have your Euclid dealer show you performance data on mine and quarry work similar to yours and you'll find that ***Euclids are your best investment.***

EUCLID DIVISION, GENERAL MOTORS CORPORATION, Cleveland 17, O.

Euclid Equipment

FOR MOVING EARTH, ROCK, COAL AND ORE

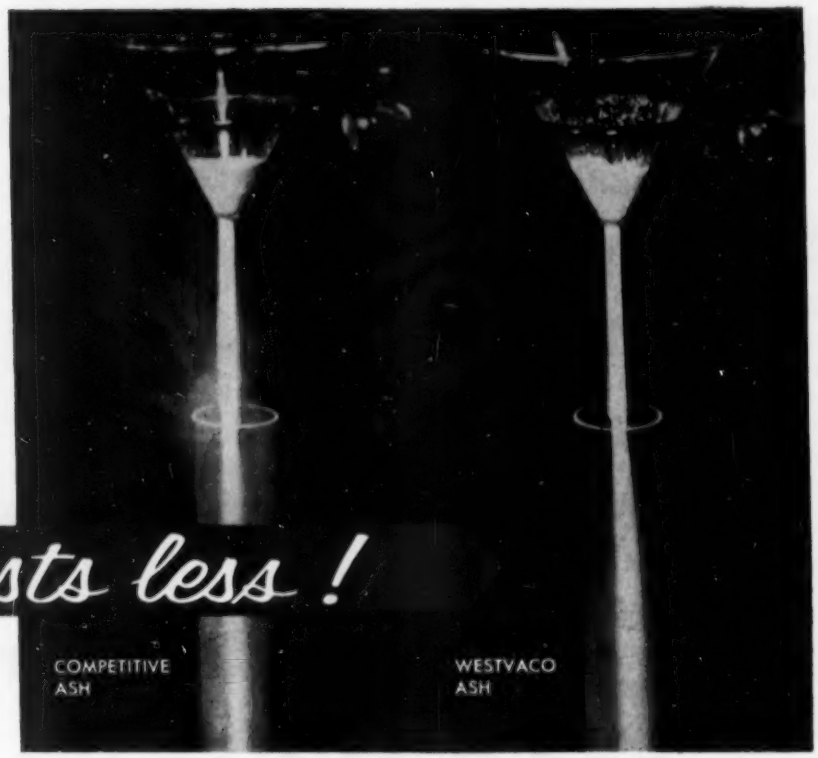
BIGGEST DIGGER ON TWO CRAWLERS

The 10 yard dipper of this big digger is impressive, for the MARION 191-M is the world's largest loading shovel on two crawlers. Equally important on the iron range is the fast, small-machine cycle time that converts mountains into rail car loads in jig time.

MARION POWER SHOVEL COMPANY • MARION, OHIO

Westvaco®

SODA ASH... *better because*



it dusts less !

"Handsome is as handsome does".

Users tell us that WESTVACO Soda Ash dusts less. The camera confirms their practical experience. We believe you'll do so, too.

So if chemical purity, absence of unwanted contaminants and insoluble residues, speed in dissolving, clarity of solutions, unusual flowability and less dusting are what you want, you'll find them all in WESTVACO Soda Ash.

Give or take a reasonable distance, our shipping territory is the Mississippi Valley to the Panhandle to the Pacific. To mills and smelters, we offer exceptional quality at regular price. Interested?

Westvaco® CHEMICALS

Westvaco Chlor-Alkali Division
FOOD MACHINERY AND CHEMICAL CORPORATION

161 E. 42nd St., New York 17 · Chicago St. Louis Denver Philadelphia So. Charleston, W. Va.

fmc FOOD MACHINERY AND CHEMICAL CORPORATION

FMC CHEMICALS INCLUDE: BEECO *Peroxygen Chemicals* • WESTVACO *Alkalies, Chlorinated Chemicals and Carbon* • *Bisulfide* • NIAGARA *Insecticides, Fungicides and Industrial Sulphur* • OHIO-APEX *Plasticizers and Chemicals* • FAIRFIELD *Pesticide Compounds and Organic Chemicals* • WESTVACO *Phosphates, Barium and Magnesium Chemicals*

ALLIS-CHALMERS

new TS-260

200 hp

11 YD (STRUCK)
14 YD (HEAPED)

power-matched ...for Production and Profit on the Job!

Power-Matched to Capacity

With more than 18 horsepower for every yard of struck capacity, the new TS-260 has plenty of power to move full loads at full speed—under all conditions.

Power-Matched for Speed

With plenty of engine power, the TS-260 loads fast, hauls fast, dumps fast . . . moves big payloads at low cost, even under tough conditions.

Power-Matched to Strength

The TS-260 has the structural strength and balance to effectively utilize all of its horsepower . . . with extra capacity built into the clutch, transmission, final drives and drive axles . . . and with a heavy, all-steel, box-type tractor frame.

Power-Matched for Operating Ease

Overlapping gear speeds in all four gear ratios reduce gear shifting, speed work cycles. And with 90-degree steering for rapid maneuvering in close quarters, it's easy for the operator to get the most out of the TS-260.

Motor Scraper

"Live-action" hydraulics for sure control. Positive gear-driven pump provides constant power for both steering and scraper operation.

Positive 90-degree steering for close-quarter maneuverability. A 30-degree turn of steering wheel directs full pump flow to two double-acting steering jacks for fast, positive turns up to 90 degrees. For slow turns, a slight turn of the steering wheel provides smooth response.

"Boiling action" loading for big payloads. Combination of curved bowl bottom and offset cutting edge eliminates voids . . . builds profitable, heaped loads.

Quick, clean spreading with high apron and forced ejection. Patented linkage moves apron ahead and up when ejector goes forward . . . providing high apron lift and exceptionally large opening.

Big 200-horsepower Allis-Chalmers diesel engine. Here is plenty of reserve for low-cost operation under all conditions. "Follow-through" combustion results in sustained power, low peak pressures . . . smooth, steady performance.

New easy-shifting transmission. New clutch brake and gear overlap in all four speeds makes it easy to shift gears smoothly, maintain steady acceleration and full pulling power.

Heavy-duty power train. The TS-260 power train transmits high engine torque to the drive wheels with maximum efficiency. The engine, clutch and constant-mesh transmission are assembled as a unit to assure accurate alignment. Simplified removal of each individual component provides easy serviceability.

Double-safety brakes for positive stops.

Balanced weight distribution for maximum traction, long tire life.

Choice of tires to fit job conditions.

Get all the facts from your Allis-Chalmers dealer—now!

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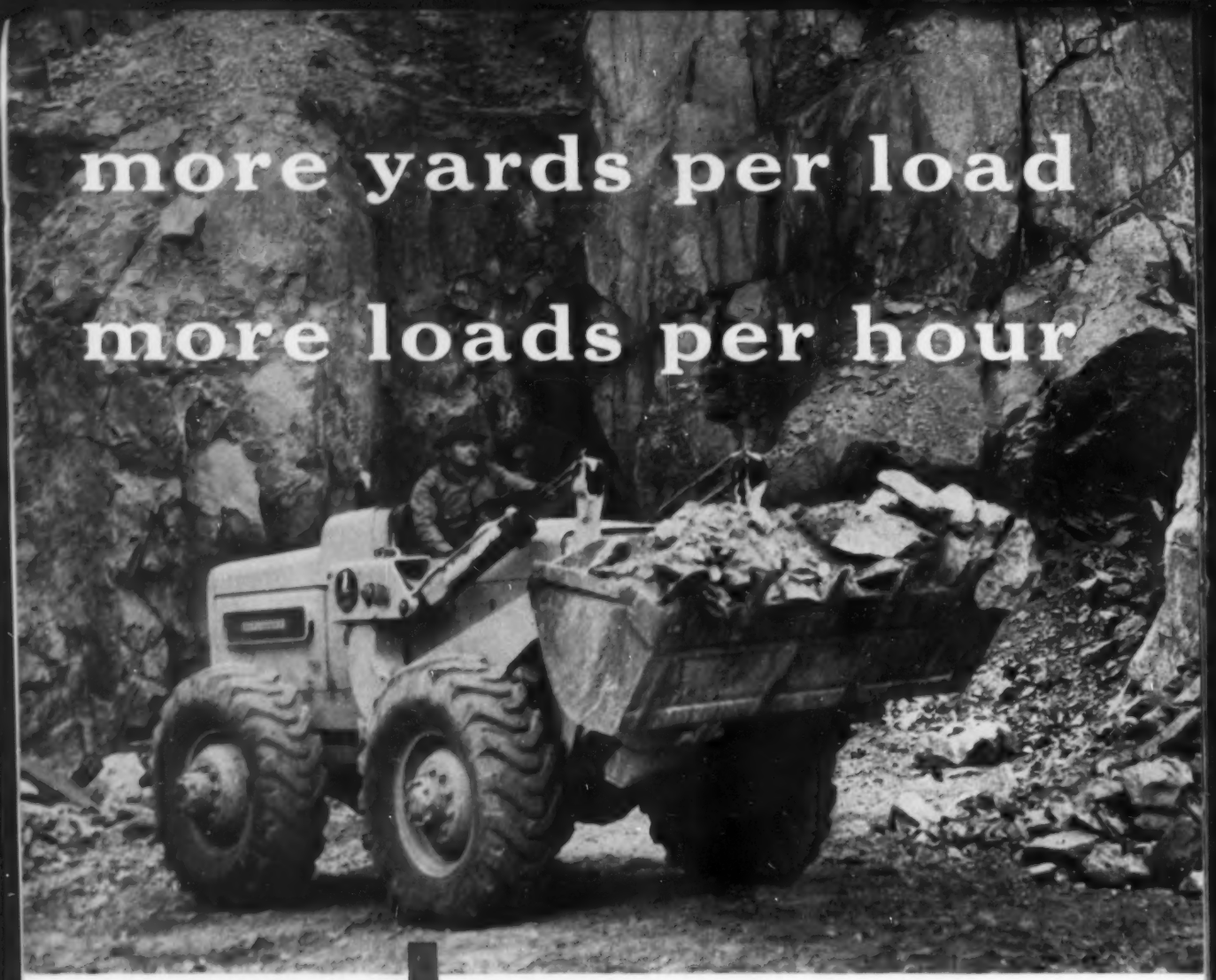

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Heaped loads are cradled closer and lower for greater stability while carrying. Exclusive load shock-absorber also cushions load, smooths the ride, and permits faster movement with less spillage.

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Whether you need maneuverability and digging power for scavenging operations like this, or want to rehandle and load ores and concentrates "PAYLOADER" tractor-shovels are designed to get and hold bigger loads and deliver them faster.

"PAYLOADER" superiority on materials handling at mine, mill and smelter is the result of 34 years of pioneering and leadership in tractor-shovel manufacture. "PAYLOADER" preference in the mining industry also comes from the fact that "PAYLOADER" is a complete proven line — a size and type to best meet each need—PLUS the finest parts and service facilities at the nearby "PAYLOADER" Distributor.

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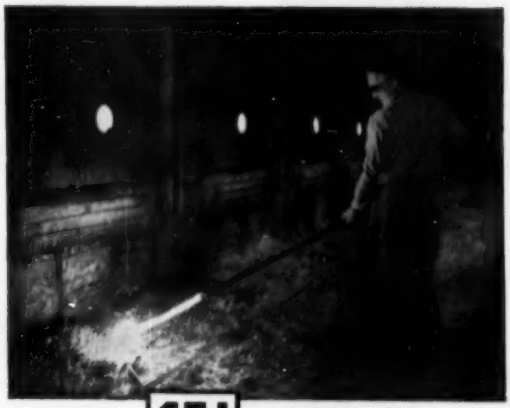

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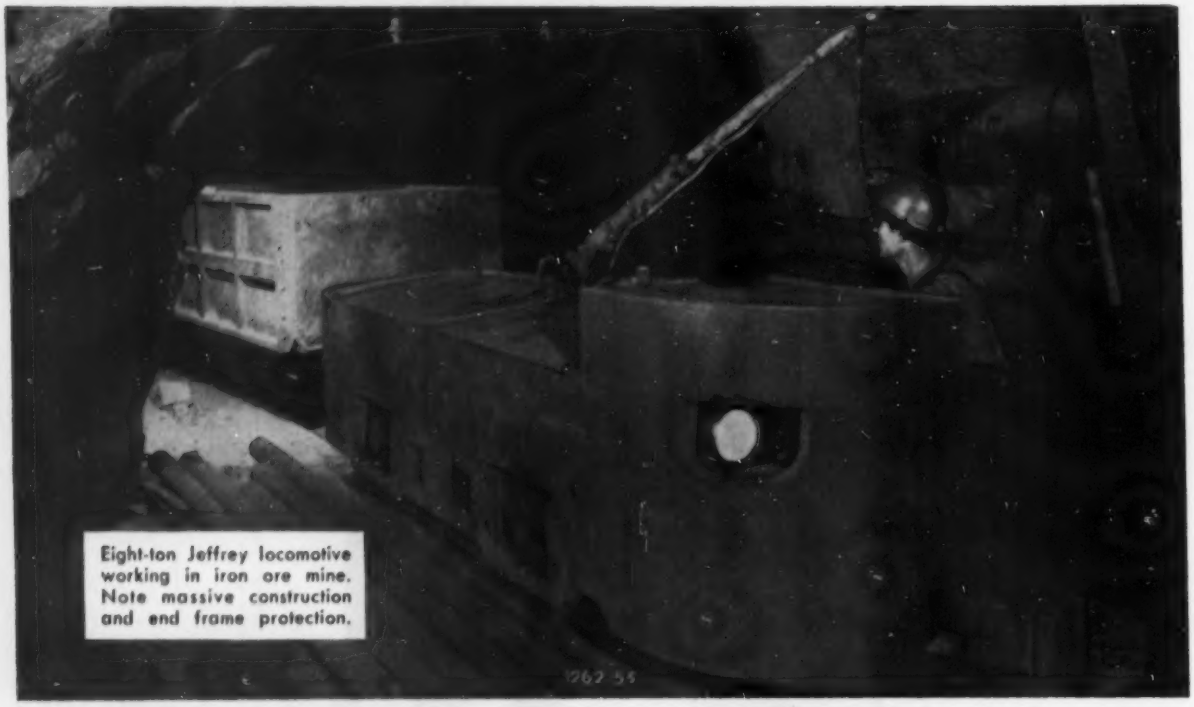
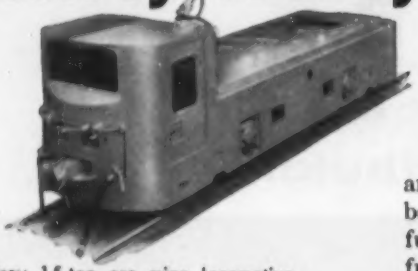
A PRODUCT OF THE COLORADO FUEL AND IRON CORPORATION



Eight-ton Jeffrey locomotive working in iron ore mine. Note massive construction and end frame protection.

Jeffrey Trolley Locomotives improve metal mine haulage



Jeffrey 15-ton ore mine locomotive. Enclosed cab offers weather protection for motorman on outside portion of haul and protection from roof falls on inside.

Six-ton Jeffrey ore mine locomotive. Rounded, welded end frames and smooth side frames with no projecting parts are desirable safety features.

Protection against "down time" and accidents to personnel are just two of the ways Jeffrey power-packed trolley locomotives benefit metal mine operations. For example, electrical equipment is fully shielded from water dripping from the roof or splashing up from the track. Gable-type covers with center channel provide drainage. Rounded end frames, the same height as side frames, protect motorman and trip rider.

Features like these can be built into any of Jeffrey's complete line of four-wheel metal mine locomotives in 4, 6, 8, 11, 15 and 20-ton sizes, and the eight-wheel 27-ton unit. The line spans the narrow gauge field – 24", 30" and 36".

Jeffrey trolley locomotives are sturdy, streamlined, easy to operate and repair. Throughout the mining world they haul high tonnage at low cost and are well known for reliability and long-term service.

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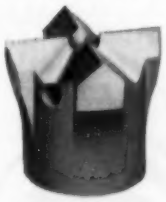
Both of these Timken rock bits give you two important advantages: 1) they are made from electric furnace Timken alloy steel, 2) a special shoulder union keeps drilling impact from damaging threads.

Our rock bit engineers may be able to help you with your drilling problems. They're experts in cutting drilling costs. There's no obligation. Write The Timken Roller Bearing Company, Rock Bit Division, Canton 6, Ohio. Cable address: "TIMROSCO".



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Most economical for ordinary ground. With correct and controlled reconditioning, they give lowest cost per foot of hole when full increments of steel can be drilled.

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Give highest speed through hard, abrasive ground. Also most economical for constant-gauge holes, small diameter holes, very deep holes.

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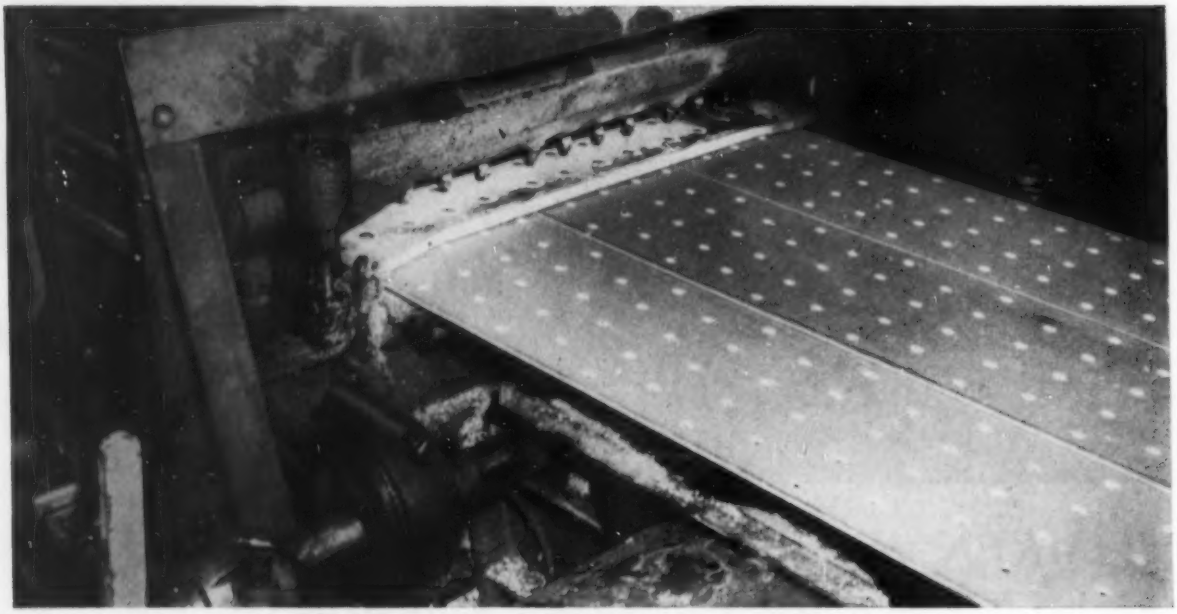
The Engineer's Field Report

CASE HISTORY
LUBRICANT *Calol Gear Compound*
FIRM *Blue Diamond Corp., Blue Diamond, Nevada*

Wet punch works 5½ years without gear loss despite extreme pressures and shock loads



BLUE DIAMOND CORPORATION, a leading Western gypsum producer, has rolled gypsum lath through this Ehrsam wet punch press 24 hours a day for 5½ years without a gear loss. Shock loads on this 500-pound punch exert extreme pressure on gear teeth, yet Calol Gear Compound keeps them in perfect condition. Even under these severe load conditions the lubricant protects teeth surfaces against galling and scuffing. Calol Gear Compound is available in eight grades to meet specifications of various gear manufacturers.

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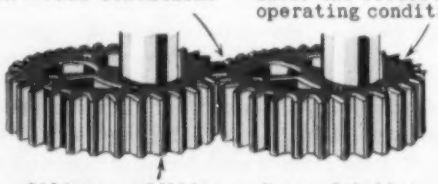
Tough film protects gear teeth against scuffing and scoring under severe shock—load conditions

Highly adhesive... clings to gear teeth and bearings, even under the wettest operating conditions



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Capitol Concentrates

Interior Department Faces Problems Drafting Healthy Mining Legislation

During hearings on the various mineral bills before the Senate and House Interior Committees, Assistant Secretary of the Interior for Mineral Resources, Felix Wormser, made much of his theory that "sub-marginal" mines should not be supported by artificially high prices or subsidies. After ODM Director, Arthur S. Flemming, agreed to extend most of the mineral programs without legislation and recommended that others be extended by the Congress with his blessing, Mr. Wormser was on somewhat of a spot. However, he quickly got off it by endorsing the legislation to extend the tungsten, asbestos and columbite-tantalite programs and to set up a new acid-grade fluorspar program. He justified his endorsement by calling the proposals stop-gap, interim programs to allow these industries to adjust themselves to free-market prices when, presumedly, producers would be able to go prosperously and merrily on their way in competition with world prices.

This viewpoint would seem to be the height of optimism, and also a little foolish. The chances are nine to one that every industry will be back prodding Congress for more relief when the individual programs run out. On the other hand, Secretary of the Interior, Fred Seaton, promised unequivocally that the Interior Department will present to the Congress early during the next session (1957) a legislative program to keep the domestic mining industry healthy. It would seem that this promise, which no doubt Seaton will be held to by the House and Senate Interior Committees, will be greatly embarrassing to the Interior Department. In effect, the White House says, "no increased tariffs—no quotas" (and, as a matter of fact, the tariffs which would be required to protect the strategic minerals are astronomical) and Assistant Secretary Wormser says no support prices or subsidies. Just where does this leave Secretary Seaton?

It is, no doubt, the near impossibility of reconciling these points of view that has prevented the Interior Department from coming up with a plan before this. The evil day has been stalled off by the various government purchase programs and it seems pretty clear that the reason for the approval of the present extensions is partly political and partly to give the Interior Department a chance to turn around and review the problem.

Much is made over the favorable impact of DMEA exploration programs on domestic mining. But, for example, would the mica producers (who numerically, for a long time, have obtained the most DMEA loans) have applied if they had to sell their product on the world market? Everyone knows the answer is "no." And the same thing applies to many other minerals. Outside of the mineral purchase programs, which we must admit are out-and-out subsidies, and the DMEA program, what can the Interior Department point to that it has done directly to stimulate mineral production? Its technical work is, of course, of the greatest value. Gathering statistics has its merits. Ultimately, however, the whole matter boils down to a very simple formula; that is, how to get the domestic producers a price at which they can operate at a reasonable profit when the open or free-market prices are below the cost of operation—if, indeed, Interior feels it is desirable that marginal and "sub-marginal" mines (and the definitions of these terms also are dependent on prices and costs) should operate at all. If the Interior Department must design a program within the present policy formula of "no import quotas—no increased tariffs—no support prices—no subsidies" nothing is more certain than that the mountain will labor and bring forth a mouse.

• Use Limitations Are Removed

The Western Governor's Conference last November made the suggestion that the Department of Defense be advised that there no longer is any necessity to design around tungsten. The Senate Interior Committee, at the instance of Senator James E. Murray of Montana, chairman, insisted that the limitation order was obsolete and called Air Force Secretary Quarles before the committee to explain the situation. The result is that the limitation order has been withdrawn not only for tungsten, but also for molybdenum and columbite. Over a period of time, therefore, the use of these metals should increase materially.

• ODM Extends Some Purchase Programs

Office of Defense Mobilization Director, Arthur S. Flemming, reports he has taken the following action concerning the purchase programs relating to domestic mica, chromite, beryl, and metallurgical grade manganese:

Mica (muscovite block and film) Program: extended to January 30, 1962;

Chromite Program: extended to June 30, 1959;

Beryl Program: extended to June 30, 1962, and the purchase quota increased from 1,500 to 4,500 tons.

Manganese (Carload Lot Program For Small Producers): extended to January 1, 1961, and the pur-

chase quota increased from 19,000,000 long ton units (equivalent to approximately 440,000 long tons of ore) to 28,000,000 long ton units (approximately 650,000 long tons of ore).

In all cases, the necessary funds have been certified to GSA for the programs.

• Minerals Purchase Bill Progresses

The Senate on June 18 passed S. 3982 which calls for the General Services Administration to establish and maintain programs to purchase specified quantities of tungsten, asbestos, acid-grade fluorspar and columbium-tantalum ores and concentrates during the period ending not later than December 31, 1958.

On June 27, the House Interior Subcommittee on Mines and Mining favorably reported the bill, with amendments. The amendments adopted by the subcommittee were those proposed by Assistant Interior Secretary Wormser. They called for: (1) a 5,000 short-ton unit limitation on the amount of tungsten the government would accept in any one calendar month from any one producer; (2) deletion of the provision calling for payment of $63.00 per short-ton unit of tungsten for production from mines with an annual output not exceeding 1,000 units; and (3) payments for tungsten and fluorspar to be made f.o.b. carriers conveyance, not f.o.b. mines.

Quantities which S. 3982 authorizes GSA to purchase are:

1,250,000 short-ton units of WO_3 at $55.00 per unit;

2,000 tons of crude nonferrous chrysotile asbestos of grades No. 1 and No. 2 combined and 2,000 tons of grade No. 3 if offered with either or both higher grades at a ratio not exceeding 1 to 1;

250,000 tons of newly mined acid-grade fluorspar at $53.00 per short ton; and

250,000 pounds of columbium-tantalum at the same prices and specifications in effect when the original purchase program was terminated.

Every effort is being made to complete committee action on the bill as soon as possible and bring it to the House floor for final action.

• Silver Repeal Measure Is Tabled

Efforts to repeal the Silver Purchase Act—at least in this session of Congress—are dead. On June 5, a subcommittee of the Senate Banking and Currency Committee, headed by Senator Douglas, considered S. 1427 to repeal existing silver legislation. Upon request of Senator Bennett of Utah, the committee tabled the measure by a 6 to 1 vote.

• Farm Items Bartered For Metals

There continues to be considerable hush-hush regarding the government's barter arrangements for the acquisition of lead and zinc of foreign origin, authority for which was contained in the Agricultural Act of 1956. However, "informed guesses" indicate that the Commodity Credit Corporation, Barter and Stockpile Division of the Department of Commerce, has been offered about 15,000 tons of foreign lead and in the neighborhood of 25,000 tons of foreign zinc, a combined total of 40,000 tons. Some of the estimates are as high as 50,000 tons.

General principles governing the purchases, laid down by the Office of Defense Mobilization, are believed to include the following: the price paid for either lead or zinc of foreign origin shall not be higher than the prevailing domestic price for each metal; the import duties of 1.06 cents a pound on lead and 0.7 cent a pound on zinc are for the account of the seller; and the seller shall pay the transportation charges involved in delivering the metals to storage points. In most instances, it is said, the agency in charge of purchases tries to pay less than the prevailing domestic price.

In addition to lead and zinc, the ODM has recommended a long list of metals and minerals for acquisition through barter. These materials are to be placed in the supplemental stockpile from which they cannot be released unless the Congress so authorizes.

• So Far No Report On S. J. Res. 148

The Senate has taken no action in its Interior and Insular Affairs Committee on S. J. Res. 148 which outlines a Congressional mineral policy and directs the Secretary of the Interior to implement it. The Administration has agreed to continue strategic and critical mineral purchases (except for low-grade manganese) in some instances and to approve legislation in others as a stop-gap program until the Interior Department devises a long-range policy. If Interior does not produce a plan we undoubtedly will hear more of S. J. Res. 148.

• Validation Is Not Automatic

Contrary to general understanding, Public Law 359, which opened reserved power sites to mineral entry under certain conditions, did not automatically validate mining claims located on power-site lands which had been withdrawn prior to the passage of the act. It is necessary to make new locations in order to validate such claims.

There is a specific requirement that mining locations made prior to the act on power sites be recorded in the Land Office wthin one year of the date of the act—August 11, 1955. This requirement also relates to those locations which were made prior to the time the lands were withdrawn for power purposes, or after they were restored to location subject to Section 24 of the Federal Water Power Act. For claims located after the effective date of the act, the recording must be made with the Land Office within 60 days after location.

COMING CONVENTIONS

September 4 through 11. INTERNATIONAL GEOLOGIC CONFERENCE, Mexico D. F., Mexico.

September 24 through 28. Annual conference and machinery exhibit of the ATOMIC INDUSTRIAL FORUM, Navy Pier, Chicago, Illinois.

September 26, 27, 28. Annual ROCKY MOUNTAIN MINERALS CONFERENCE, AIME, Salt Lake City, Utah.

September 30 through October 2nd. Joint convention and exposition of the AMERICAN MINING CONGRESS ON SURVEYING AND MAPPING and the AMERICAN SOCIETY OF PHOTOGRAMMETRY. Shirley Savoy Hotel, Denver, Colorado.

October 1 through 4. Mining show and exposition of the AMERICAN MINING CONGRESS, Shrine Hall, Los Angeles, California.

November 1, 2, 3. Annual convention of the NEW MEXICO MINING ASSOCIATION, Carlsbad, New Mexico.

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The test work leading to this change-over, and the conversion itself took less than a week, with the Cyanamid engineer on the job during that time to aid plant personnel.

Perhaps a Cyanamid representative can show you, too, how to effect savings in reagent costs and improve your plant metallurgy. For the name of the representative nearest to your operation, contact any of the offices listed.

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Two types of crushers are available—type "H" has anti-friction bumper bearings and bronze side bearings. Type "J" has anti-friction bearings for bumper and side bearings. Available in sizes 5" x 6" to 36" x 48".

2. LONG-LASTING JAW PLATES

Genuine 13-14% manganese cast steel is used for jaw and cheek plates on Denver Jaw Crushers. Jaw plates are reversible so that service life is greatly increased and replacement costs cut.

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Mining World

THE IMPORTANT MINING MAGAZINE EVERYWHERE

August 1956

INTERNATIONAL PANORAMA

TORONTO, CANADA — Mineral Exploration Corporation Ltd. (MINEX) will erect a 150-ton custom zinc smelter on Cape Breton Island.

CLEVELAND, OHIO—Republic Steel Corporation is now an equal partner with the Crane Company in Cramet, Inc. which is a large titanium sponge producer. Republic has long been a melter and roller of titanium.

PORT au PRINCE, HAITI—Reynolds Haitian Mines, Inc., the Reynolds Metals Company subsidiary, has started bauxite mining in Haiti. Regular production is set at 400,000 annual tons with reserve capacity at 900,000.

LOMAS, PERU—Pan American Commodities, S. A. plans to develop the Acari iron ore deposits east of here, build a 30 mile railroad from the mines to this port, and build modern harbor installations here. First ore shipments are scheduled late in 1957.

TOKYO, JAPAN—Two Japanese firms will supply the Harvey Aluminum Company's plant at The Dalles, Oregon with 105,000 tons of alumina annually for a five-year period.

COLERAINE, MINNESOTA—Oliver Iron Mining Division of U.S. Steel Corporation will add heavy media separation sections to its Trout Lake beneficiation plant, enabling it to treat 1,600 tons of crude ore per hour.

EWARTON, JAMAICA—Alumina Jamaica Ltd., a subsidiary of Aluminium Limited, will build a second alumina plant on the island of Jamaica. This will produce 245,000 tons annually, with first output expected by mid-1958.

TUBA CITY, ARIZONA—Rare Metals Corporation of America's new uranium mill is now operating at capacity. It is the 11th operating uranium mill in the United States.

NEW YORK, NEW YORK—Vitro Rare Metals Company, division of Vitro Corporation of America, will build a primary uranium processing plant at Cannonsburg, Pennsylvania.

JAMESTOWN, ONTARIO—The Sir James iron mine of Algoma Steel Corporation has been officially opened. The mine is expected to yield 7,000,000 gross tons by open-pit mining over a six-year period.

LA PAZ, BOLIVIA—The Bolivian government has approved a contract with the South American Gold & Platinum Company for development of gold and platinum deposits in the Kaka River, province of Caupolican.

JOHANNESBURG, SOUTH AFRICA—Anglo-Transvaal Consolidated Investment Ltd. will form a new Rhodesian company to work the North Charterland concession area. Negotiations were concluded with Magundi Copper Mines & Minerals and North Charterland Exploration Company (1937) Ltd. for sole prospecting and mining rights.

SALT LAKE CITY, UTAH—Bear Creek Mining Company, exploration subsidiary of Kennecott Copper Corporation, will search the East Tintic district of Utah for lead-zinc-silver ores under an agreement with Chief Consolidated Mining Company, Tintic Standard Mining Company, South Standard Mining Company, Eureka Standard Consolidated Mining Company, and Eureka Lilly Consolidated Mining Company.

SAN FRANCISCO, CALIFORNIA—United States Atomic Energy Commission contracts have been awarded to Union Carbide Nuclear Corporation for three new uranium mills. One at Rifle, Colorado and two smaller upgrading mills at Green River, Utah, and Slick Rock, Colorado.

SAO PAULO, BRAZIL—A new copper district has been discovered near Martins, Rio Grande do Norte State. The area is being studied by the Brazilian Department of Mineral Production.

SANTIAGO, CHILE—Copper production in Chile is estimated at 420,000 tons in 1956. This compares with 390,400 in 1955.

WINDHOEK, SOUTH WEST AFRICA—A new byproduct molybdenum source is now producing. Molybdenum is recovered as a copper byproduct in the ratio of 1 to 22 at Lorelei Copper Mines Ltd.

Bear Creek Planning New 1,000-Foot Tintic Shaft

Bear Creek Mining Company, the exploration subsidiary of Kennecott Copper Corporation, will undertake a multimillion dollar non-ferrous metals project in the East Tintic district of Utah after gaining the approval of mining companies in the area. Participating firms are Chief Consolidated Mining Company, Tintic Standard Mining Company, South Standard Mining Company, Eureka Standard Consolidated Mining Company, and Eureka Lilly Consolidated Mining Company.

Under terms of the agreement, some 10,000 acres of mining claims in this Eureka-Tintic district will be explored. The contract is for 50 years, with the right to renew for an additional 50 years if desired. The companies involved will have a 37½ percent interest in the unit. All costs will be borne by Bear Creek.

If ore is discovered on the properties of Chief Consolidated, that firm would receive 66⅔ percent and the Tintic group companies would receive 33⅓ percent of the 37½ percent interest. Conversely, if ore were discovered on properties of the Tintic group of companies, they would receive 66⅔ while Chief Consolidated would receive 33⅓ percent of the 37½ percent interest.

A 1,000-foot exploration shaft will be sunk first to fully prospect the area at depth.

In another move, Bear Creek is reported to be negotiating with Zuma Uranium and Oil Corporation for a lease on the Zuma lead-silver-zinc properties, also in the Tintic district. These claims are near the project described above.

Reynolds Gets Bauxite From Haiti Subsidiary

Bauxite ore for Reynolds Metals Company is being supplied by a new subsidiary corporation, Reynolds Haitian Mines, Inc. The Haitian facilities started production the last part of July and are designed for a regular output of 400,000 tons a year, with reserve capacity sufficient to process 900,000 tons a year and to ship larger quantities when necessary.

Shipments will go to the Reynolds operations in Corpus Christi, Texas from a pier installed near Miragoane on the island's south peninsula, about 80 miles from Port-au-Prince.

We are sorry that the article on Consolidated Coppermines' new Tripp pit scheduled for this issue has been unavoidably delayed by urgent and continuous labor negotiations. Watch for it in an early issue.

In September—What To See At Los Angeles' Mining Show

RIO DE ORO, FIRST AMBROSIA LAKE URANIUM mine, headframe and surface plant are shown above. The all-steel headframe and 400-ton ore bin are on top of a 400-foot vertical shaft. Rio de Oro mined its first ore in March.

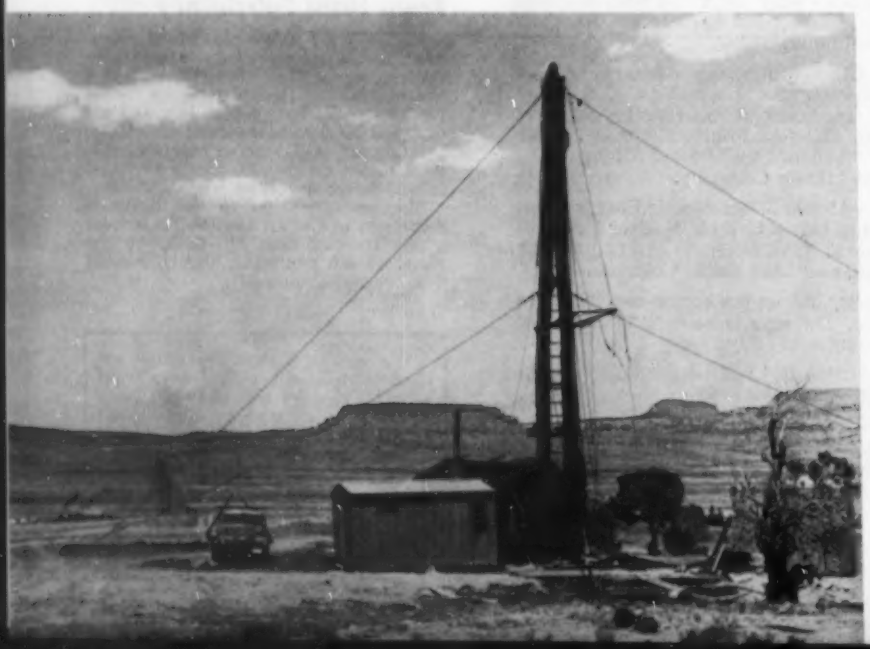
Rio de Oro Leads The Industry To Mine First Ambrosia Lake U_3O_8

It is fortunate for the uranium mining industry that a mining company, managed by experienced metal miners, has been the first to get into actual production at the fabulous Ambrosia Lake district in Valencia County, New Mexico. This is Rio de Oro Uranium Mines, Inc. whose mine is in the south ½ of Section 11, Township 14 North, Range 10 West.

Rio de Oro's general manager, Claude Jones, with years of hardrock mining experience in the Tri-State district, has successfully proved that the many fears conjured about mining in Ambrosia Lake are completely unjustified. Specifically, Rio de Oro has proved that water, at least in the northern end of the district, will present no mining problem; that the Westwater sandstone, in which the ore is found, is a competent rock and there will be no problems of a feared soft sluffing back. Also, mining can safely be extended up to widths between 30 and 40 feet in this ore zone.

Of equal importance to future producers in the district is that it appears, from the first 1,300 feet of development in the ore zone by Rio de Oro, that the actual tonnage to be mined will be greater than that indicated by drill hole results. However, maintenance of grade is and will be a problem to all operators because of the nature of the mineralization. There are many multiply ore horizons which thicken and thin and, in places, converge. In other places, both the foot and hanging walls undulate and roll.

Metallurgically, Rio de Oro is important too because it mined the first large tonnage shipments of Ambrosia ore for pilot plant testing in the Atomic Energy Commission's laboratory. Other companies projecting mills have been able to secure only several hundreds of pounds of diamond core drill samples for ore testing. True, each ore body has its individual metal-



DYSART NO. 1 well, at right, was start of Ambrosia Lake U_3O_8 when radioactive cuttings were found in April 1955. Note Rio de Oro shaft in background.

lurgical characteristics, but all ores in the district also have many similar ones.

Ore in Westwater Sandstone

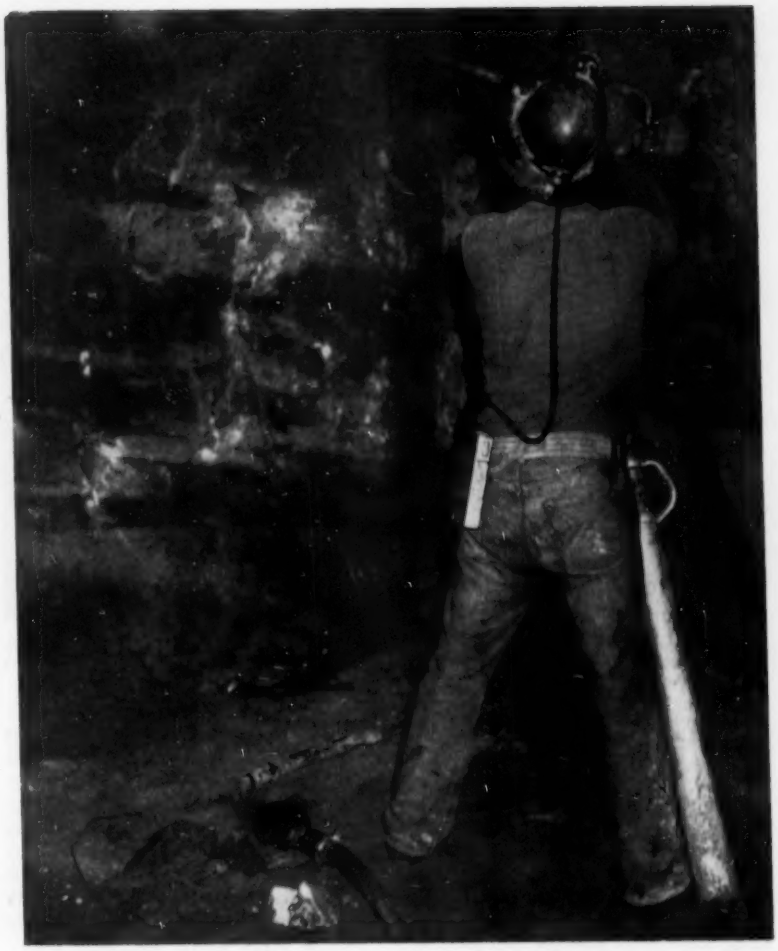
The ore is found in a Westwater Canyon member of the Morrison formation of the Jurrasic age. In the Rio de Oro mine, the Westwater is a white sandstone, medium to coarse grained. The ore is typical of the Colorado Plateau in that it has definite roll structures, both on the top and bottom, with an ore to waste cut-off within an inch. Note the cross bedding and rolling nature of the ore bodies in several of the accompanying photographs. The ore is black due to hydrocarbons; in fact, the blacker the ore, the higher the grade generally, but black footwall zones are commonly below ore grade. Calcite is a common accessory mineral occurring in distinct grains. In certain faces in the mine, highest grade mineralization seems to be concentrated around a conglomerate lense in the sandstone. Rough angular grains of orthoclase, ¼ to ⅜ inch in size, are distinctly visible surrounded by ore. Other areas a few feet away show blue clay pockets.

Rio de Oro is important for other reasons, too. It is just several hundreds of feet north of the initial Ambrosia discovery made in April 1955 by Louis Lothmann of the Mid Continent Exploration Company who found uranium mineralization in cuttings from the abandoned dry hole of Dysart No. 1 drilled on the Ambrosia Lake dome in 1925 in the search for oil.

Mr. Lothmann started drilling for uranium north of the Dysart No. 1 hole and found uranium ore grade mineralization in the first hole and the subsequent two holes. With these favorable drill hole showings, Mr. Lothmann secured financing from Dunn Brothers, a pipeline company of Irving, Texas, and proceeded to drill out the south half of Section 11, Township 14 North Range 10 West on 100-foot centers. Forty-eight of the first 50 holes drilled contained ore grade mineralization from one to several tens of feet in thickness.

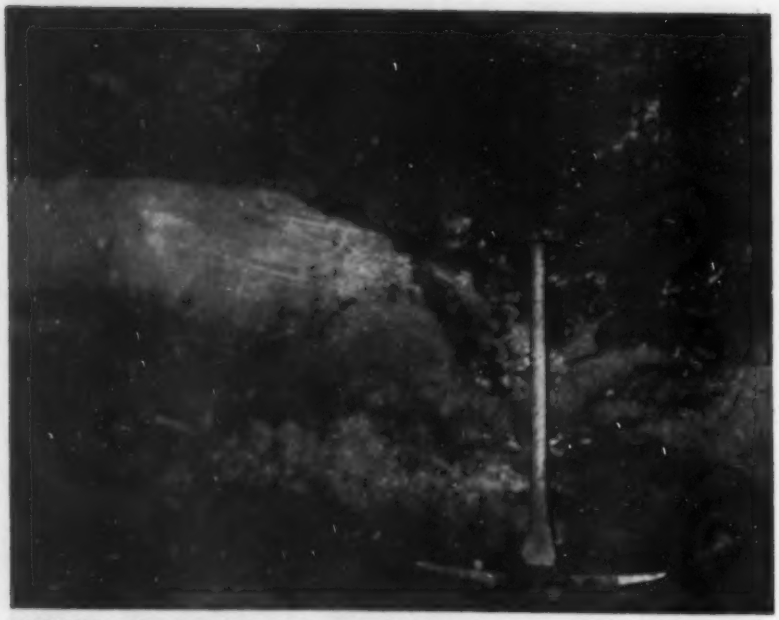
Rio Oro Enters Area

In the summer of 1955, G. R. "Bufalo" Kennedy, who had many years of uranium exploration knowledge gained on the Colorado Plateau with Kerr-McGee Oil Industry Incorporated's Navajo Uranium Division, became interested in the property. Mr. Kennedy and W. Rodney DeVilliers, now president of Rio de Oro, formed the Rio de Oro Uranium Mines Inc. and secured control of Mid Continent



AIRLEGS SPEED DRILLING out a drift round. Gardner-Denver machines and Copco integral-type tungsten carbide chisel bits are used. Each round takes 32 holes with a burn cut to break 30 to 35 tons of ore.

ORE FACE at Rio de Oro shows the typical banded and irregular occurrence of the dark colored uranium ore in the white sandstone gangue. Initially, headings were mucked out into skip pockets with slushers.



FOOTWALL ORE ROLL is shown in this typical underground picture. The pick indicates scale. Both the foot and hanging walls show this undulating nature; often the ore "rolls" from ore to waste in a matter of inches in orebody proper.

Exploration Company. In August, Messrs. Kennedy and DeVilliers interested Claude Jones in the operation and persuaded him to become general manager. This proved a fortunate choice for Mr. Jones's 40 years of experience as a leading independent operator in the Tri-State has enabled Río de Oro to establish a model small mine plant and get into production before any other company in the district.

After arriving at the property, Mr. Jones immediately ordered that 50 core holes be drilled on 50-foot centers between the 100-foot, grid-spaced, rotary holes which had been probed with a gamma ray counter for grade and thickness. These 50 holes all cut ore grade mineralization from four to 30 feet thick. Drilling had outlined an ore body 1,900 feet long and 500 feet wide.

Sink 400-Foot Shaft

In September 1955 Mid Continent's shaft had been sunk only 40 feet. In mid-October Melvin Perry from Picher, Oklahoma was appointed mine superintendent and really went ahead with shaft sinking. The three-compartment vertical shaft was completed to a depth of 400 feet in December.

The shaft has a rock section 8 by 16 feet with three equal-sized compartments inside the 14- by 5-foot timbering. Framed shaft sets of 8- by 8-inch timber were used. Lining is vertical 2- by 12-inch planks.

The main level was cut in the ore horizon at a depth of 352 feet. This left plenty of room below the level for installation of two 200-ton-capacity skip pockets. One to the east, the other to the west. Each is divided into a waste and ore pocket. Air-operated gates permit loading of either ore or waste from either of the two pockets into two-ton bottom dump Denver Vulcan skips which are hung under conventional cages.

A concrete ring was poured around the shaft with its top being level with the floor of the main station.

A site had been chosen so that the shaft reached the ore zone in a barren area so that adequate unmineralized pillars could be left to protect the shaft and pockets.

After the shaft station, which is 20 feet high, had been completed, a circular drift was driven completely around the shaft, leaving pillars 40 to 70 feet in length. These two circular drifts permit adequate turning and dumping room at either pocket for the Diesel truck and Diesel semi-trailer used for ore and waste haulage.

Developing the Mine

The next step was to start the main 10- by 10-foot haulage drifts east and west from the pockets. From these main drifts, crosscuts will be turned and driven in the ore to provide additional working faces. By the first of July, 1,300 feet of drift and crosscut had been driven, as well as 50 feet of raises to reach a higher band of ore. Drifting hit ore a few rounds from the station; in fact, hit ore before surface drilling had indicated it would be present.

For initial level development, broken ore was slushed to the pockets by two-drum Gardner-Denver and Ingersoll-Rand slushers. Cross slushing was necessary to muck out the crosscuts as they were turned from the main drifts. Drifting was pushed to a point where auxiliary ventilation through a drill hole was possible. Then, a Diesel-powered truck and semi-trailer brought from the Tri-State were lowered into the mine together with a Joy electric-powered BU 8 coal-loading machine with an 18-inch loading chain. This machine will load 50 tons per hour with a minimum 5-foot stope height. Inci-

VULCAN-DENVER double-drum hoist was specially engineered to provide trouble and foolproof operations at this remote mine. Ore is hoisted in Vulcan-Denver, two-ton, bottom dump skips slung under conventional man cages.

dentally, this is the first electric powered loading machine of this type used in the uranium mines and its operation is being watched with great interest by many operators. The Diesel truck and trailer units, equipped with exhaust gas scrubbers, will operate in a minimum of 4½-foot clearance. However, 7-foot minimum height is desirable for driver safety.

Production from Development

Headings are drilled with Denver airlegs using Copco integral chisel-type tungsten carbide bits. One 6-foot steel is used per hole. A round consists of 32 holes using a Burn cut. Two hours are required to drill out a face. One machine man and a helper drill out three rounds and load and blast them per shift. Atlas 25 percent powder is used for blasting with fuses for ignition. Each round breaks from 30 to 35 tons of ore. The mine operates three shifts per day, six days a week, with a five-man underground crew and one jigger boss per shift. Ore thickness has averaged seven feet, but in places it has pinched down to three to four feet. There the ore is shot first, mucked out, and then the waste bench is shot to bring the drift to full height.

A Denver Vulcan two-drum hoist is used. This hoist is equipped with air brakes and automatic safety controls.

Surface facilities include a change room, hoist house, compressor building, Diesel-electric power plant, and a well constructed and well insulated bunk house and cook house.

The 84-foot, all-steel, head frame with a two-compartment, 400-ton bin, was purchased from an abandoned coal mine north of Denver, Colorado, and moved to the site.

TRI-STATE MINERS direct Rio de Oro. Claude Jones, left, general manager, long-time independent operator is developing the mine by proven Tri-State methods. Melvin Perry, Picher, Oklahoma ground boss, is Rio superintendent.

Two Fairbanks-Morse Diesel electric sets generate power for the mine and camp. One is a 300-horsepower unit and the second, an 87-horsepower stand-by unit. An electric-driven Gardner-Denver compressor supplies 600 cubic feet of air per minute for drilling.

Rio de Oro drilled a water well 840 feet deep, ¾ mile east of the shaft. A deep well pump supplies 10 gallons of water per minute. A buried pipeline brings the water to the camp where it is used for camp purposes and for cooling the Diesel engines.

First ore, and all ore mined to date has come from development, was shipped in the last half of March when two 500-ton test shipments were made to Grand Junction, Colorado.

Plan Mill At Grants

Rio de Oro, the Investment Operating Corporation (subsidiary or holding corporation of Foley Metals Corporation—Foley Brothers of New York, and Los Angeles), United Western Minerals Company, San Jacinto Petroleum Corporation, J. H. Whitney and Company and White, Weld and Company have been negotiating with the United States Atomic Energy Commission for a uranium concentrate purchase contract so that the group can erect a 700- to 1,000-ton uranium mill in the Grants area. Negotiations are handled by Clyde Osborn. This mill would treat ore from Ambrosial Lake properties of the various participating companies.

Early in July, Rio de Oro started shipping ore under a minimum monthly quota of 1,500 tons to the new AEC ore buying station just west of Grants and 25 miles south of the mine.

Rio de Oro has led the production at Ambrosia Lake. Its mining operations will be watched with interest, especially the blending of ore to grade and metallurgical type. Mr. Jones is confident that he can do just that by controlled mining from a large number of headings.

Through June an additional 2,900 tons of ore had been shipped to mills in New Mexico and Colorado.

SLUSHING ORE directly into shaft skip pockets. This two-drum, air-powered slusher was used for initial development near the shaft. Diesel trucks are now used for transportation to the pockets. Picture taken at top of pocket.

1. Powder for blast hole loading.

2. Primacord is tied through primer.

How Fertilizer Cuts Anaconda's

Noah Webster says "Ammonium nitrate—an explosive and a fertilizer." The powder men at Anaconda Company's open-pit copper mine at Weed Heights, Nevada calls ammonium nitrate "manure." However, A. E. Millar, general manager at Weed Heights, doesn't care what they say because he knows its use saves him money for primary blasting in the big pit. What's more, it's safe. That's why—above low cost—that Mr. Millar uses it.

The accompanying table shows why this fertilizer grade ammonium nitrate is saving Anaconda money.

Powder Comparisons Per Hole At Anaconda Company's Weed Heights Pit

OLD

Explosive	*Weight*	*Cost*
Special Gelatin—60% 1*	25 lbs.	$4.50
Nitro-carbon-nitrate	175 lbs.	$20.51
		$25.01

NEW

Explosive	*Weight*	*Cost*
Special Gelatin—60% 1*	25 lbs.	$4.50
Ammonium Nitrate Dynamite—40%	50 lbs.	$7.58
Ammonium Nitrate, Fertilizer Grade	130 lbs.	$6.49
		$18.57

*Primer

Then $25.01–$18.57=$6.44 saving per hole. Each hole breaks an average of 1,000 tons. Every day 30,000 tons of ore and rock waste are moved from the pit so daily saving is 30 x $6.44=$193.20 or 0.644 cents per ton.

The important thing to note from this table is that with the nitro-carbon-nitrate explosive, which is one of the "Akremite" type powders, a big saving was already being made over the earlier use of gelatin and semi-gelatin powders.

True, the Weed Heights ore and waste are relatively soft, are strongly

5. Stem hole with drill cuttings.

6. Last hole in blast is loaded.

3. Primer is lowered into hole.

4. Pour fertilizer into hole.

Blasting Cost At Weed Heights

oxidized, and there are many joint fractures and slippage planes which make blasting relatively simple in comparison with some other copper pits. A minimum of secondary blasting is necessary.

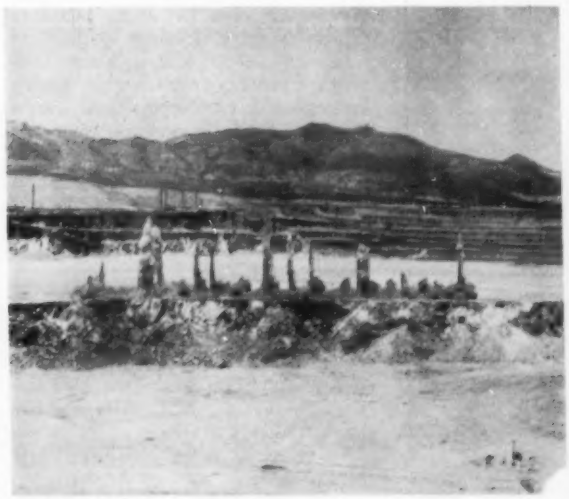
Be that as it may, the saving of $195.60 per day is an important operating economy.

W. H. blasting practice calls for shots of three rows of holes with both rows and holes spaced 20 to 25 feet apart. All holes are detonated by Primacord with millisecond delay connectors between rows. The holes are 30 feet deep for the 25-foot-high benches. The primacord is detonated by electric cap. Loading practice calls for a primer on the bottom, then pouring of the bulk ammonium nitrate fertilizer into the hole from paper sack containers, around a column load of the 40 percent powder in 4 in. cartridges. Both the bottom primer and the 40 percent column load are completely surrounded by the free-flowing fertilizer. After the last of the fertilizer has been poured on top of the column load, the hole is stemmed to the collar with rotary drill cuttings.

The mine supt. uses his judgement and in particularly hard areas more bottom primer is added to the hole. The bottom primer is a high velocity primer with a higher velocity than the column load.

Experience with ammonium nitrate at W. H. has been good. In only one instance did a few paper bags harden before they could be used and they were immediately returned to the manufacturer.

Continued on page 88 (WM72)

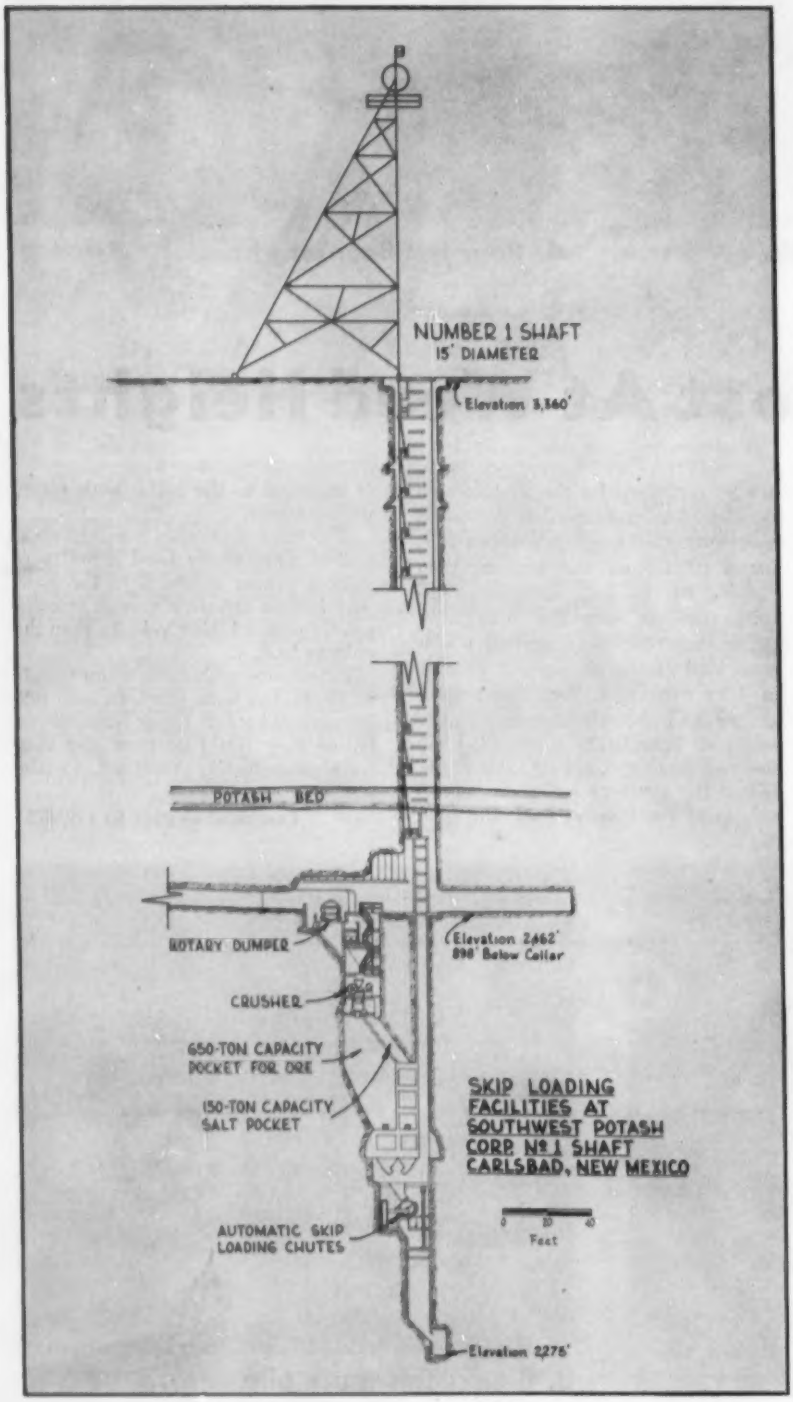


7. "Fire" in the pit.

8. Breaks this muck pile.

Southwest Potash . . . .

Schedules Continuous Production And Haulage From Face To Surface



Ever since mining first started at Southwest Potash Corporation, a wholly owned subsidiary of The American Metal Company, Ltd. near Carlsbad, New Mexico, emphasis has been placed on moving blasted ore away from the face and hoisting it to the surface as efficiently as possible. Starting at the face, the first link in the chain of events is mechanical loading of shuttle cars; the second is rail hauling of 17-ton mine cars over a traffic controlled route to the Number 1 or muck shaft. At this point a rotary dumper empties the cars, and an automatic skip-loading and an automatic hoisting installation take over to deliver the ore to the surface.

The application of undercutters, mobile jumbos, loaders, and shuttle cars in the Carlsbad Basin has resulted in the development of methods closely approaching continuous mining; and continuous mining is only as good as the transportation set-up. A bottleneck means that equipment is idled. A short delay of only 15 minutes poses quite a problem. At Southwest Potash this is about half the time required to undercut a 30-foot wide face; it's about half the time needed to drill a round in a heading of the same width; it's about one-fourth of the time needed to muck out a 100-ton blast.

A muck-bound face results in the loss of a considerable amount of production so care has been taken to design a good haulage system to eliminate delays and prevent accidents. In this connection each trolley locomotive has been equipped with a Mine Safety Appliance minephone so that motormen can stay in contact with each other. Automatic switch throws and signal lights help keep traffic moving smoothly.

Two Shafts

Two vertical shafts serve the mine at Southwest Potash and they are spaced on 400-foot centers. Number 1 shaft is 15 feet in diameter inside the concrete lining, and ore is hoisted through this shaft in two 11.7-ton-capacity skips. The Number 2 or service shaft is 20 feet in diameter and is divided by a 9-inch curtain. It serves as the exhaust course for

mine ventilation. Both shafts are interconnected on the 490-foot horizon and on the haulage level 898 feet below the surface. Both shafts are lined with concrete to a point 470 feet below the collar where they then enter the top of the salt formation.

The muck shaft is topped by a 135-foot structural steel headframe, and skips dump their loads into two 750-ton bins built in the installation. The headframe over the service shaft is 90½ feet high. An auxiliary head sheave has been installed in this headframe and is used occasionally to lower large pieces of equipment. The auxiliary sheave plumbs the center of the shaft, and does away with the necessity for dismantling much of the machinery before it is lowered.

Single Hoist House

The shafts were planned so that all hoisting equipment could be centrally located in the same building with ropeways leading to head sheaves from opposite sides of the hoist house. Control consoles for each hoist are located at opposite sides of a small room within the hoist house. Since muck is hoisted automatically, only one hoistman is required. The close proximity of controls for both hoists makes it possible for one hoistman to man the service hoist and oversee the operation of the muck hoist.

The producing horizon of the mine, 900 feet below the shaft collars, is nearly horizontal (actual dip is 90 feet per mile). Mining height is between 5 and 6 feet. The mineable salt bed rolls and undulates gently which means that tracked haulageways often traverse grades up to 5.2 percent. To prevent the hazard of runaways, locomotives must be equipped with several different types of braking systems; derail switches are also added as a safety feature.

Room and Pillar Mining

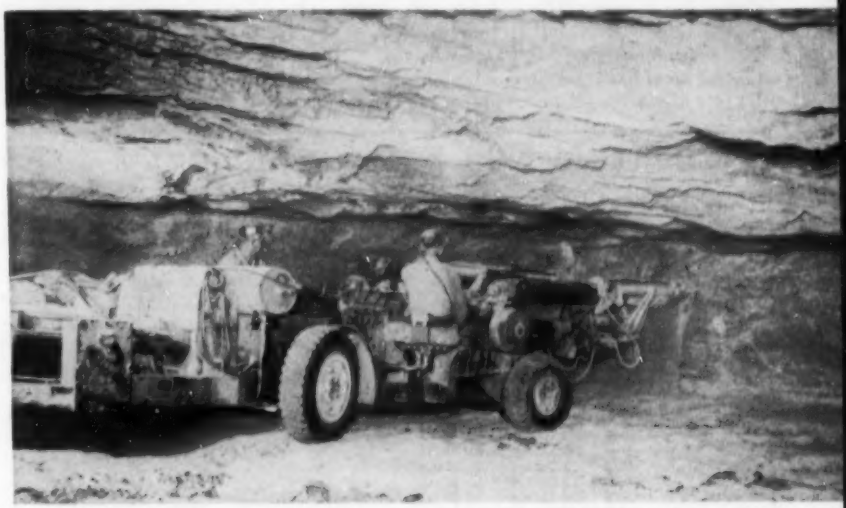
Mining is done by room and pillar methods in which 32-foot-wide headings, spaced on 92-foot centers, are advanced. This leaves a 60-foot pillar between adjacent headings for support of the back. Pillars are holed using the same pattern. This method results in a 55 percent extraction of the ore before pillars are robbed.

The cycle followed in preparing each face for blasting, the blasting procedure, and the mucking operation go something like this. First, the face is undercut with a Joy Universal (15RU) machine with a 9-foot-long cutterbar. The resulting kerf is approximately 6 inches high. Cutting this bottom slice across the face requires approximately half an hour.

Drilling Practice

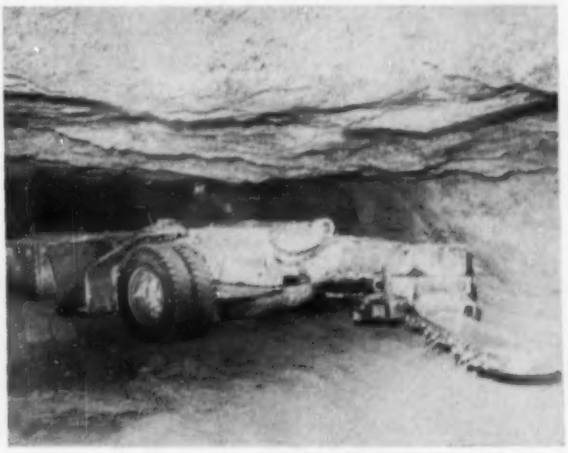
The next step is to remove the undercutter and drill blast holes using a Joy, model 42-D jumbo which mounts two machines.

The Joy jumbo contains two consoles from which two men control the drills. The operators can maintain complete positioning control of the drills from the console; this includes movement of the booms up, down, or laterally and tilt of the drills. Nine-foot sections of hollow drill steel are used to drill the rounds, and cuttings are removed by air. The jumbo, powered by 440-A. C. current, is mounted on rubber tires. Electric motors drive hydraulic pumps which control boom and drill movements. It only requires a minute or so to collar and finish a



ELECTRIC POWERED rotary drills are used in the 32-foot wide headings. After undercutting, a standard eight foot round is drilled with this Joy model 41-D jumbo mounting two drills. The face is drilled out in only 35 minutes.

JOY SUPER 14 BU loading machine mucks headings and loads a Joy shuttle car with seven to nine tons. This cable reel car trams 200 to 500 feet to nearest train loading point.



UNDERCUTTERS are used in all headings. This Joy Universal 15 RU unit has a 9-foot long cutter bar. It takes 30 minutes to cut a 32-foot wide heading.

hole. With the two drills half of the 32-foot-wide face can be drilled from one positioning of the jumbo. The unit is then moved to line up and drill the remaining half. The entire face is finished in about 35 minutes.

The drill rounds have been standardized throughout the mine and actual placement of holes is closely controlled by supervisors. Some may even indicate where each hole is to be drilled. Where backs are lower than 6½ feet, the round is made up of three, horizontal rows of holes. If headings are higher than this a four-row pattern is used.

Bottom V-Cut

In a typical three-row pattern, 32 holes are drilled and the round is loaded with 298 sticks of powder, including primers. The holes in the lower row are placed about 30 inches above the bottom. These holes are angled downward so that they bottom at 8 inches above the kerf when a 9-foot steel has been used. The middle row is spaced 12 inches above the lower row and the top row is placed just below the back which is 5 to 6 feet high.

This round is timed with millisecond delays so that the lower row of holes and arching section in the center of the face is blasted simultaneously. Reference to the accompanying diagram will show that with the next delay, the entire center of the face is relieved. The ground remaining in the upper corners is timed to fire last. With this type of round, the tendency is to throw the muck away from the edges of the face toward the center of the heading leaving a clean corner. This makes a heading easier to muck following a blast.

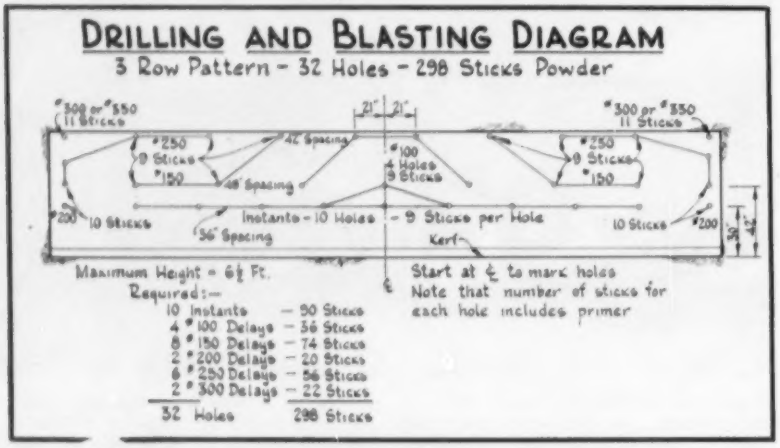
Holes are loaded with 35 percent powder in 1- by 8-inch cartridges. Within each section of the mine, one man handles blasting duties for all the faces under preparation.

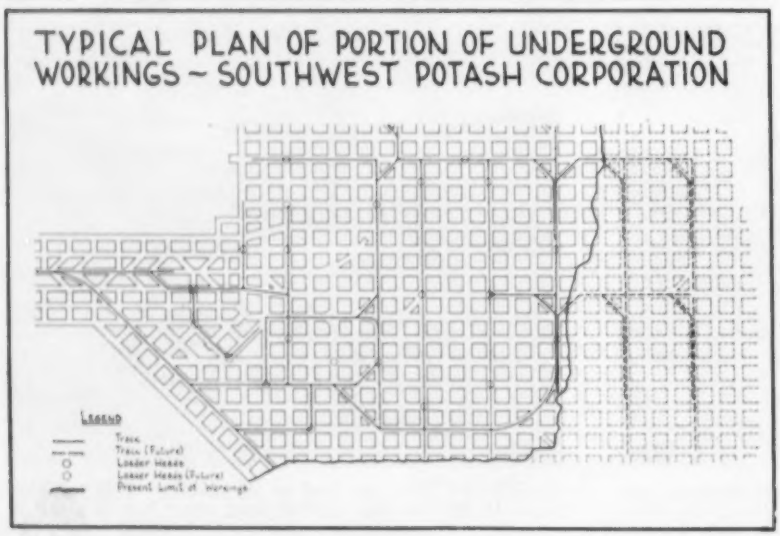
Mucking

Joy Super 14 BU loading machines are used to muck the headings. An 8-foot round in one of the headings will produce about 100 tons of ore. Gathering arms on the front of this crawler-mounted unit drag ore to a chain conveyor. The rock is discharged from the tail boom on the loader to a Joy shuttle car. Two shuttle cars work with each loading machine, and the length of the tram to the nearest train-loading point is never over 500 feet. As a general rule this distance is about 200 feet. The shuttle cars have a 7- to 9-ton capacity and travel on four rubber tires. The units can be steered using either the front or the rear wheels for turning. They operate equally well in either direction. A seat is mounted on each side of the vertical steering column, and the operator merely changes position to face the direction of movement. The bottom of the shuttle car contains a chain conveyor which aids loading and provides quick positive dumping action. Electric power is carried to the shuttle car over insulated mine cable which is maintained under tension by a cable reel mounted on the machine.

The shuttle cars operate on 250-volt d.c. power which is supplied from package rectifier stations spotted as closely as possible to working areas.

Roadways over which shuttle cars travel to reach train loading stations are maintained by using the undercutter to trim high spots. A small Fordson tractor equipped with a blade is also used to smooth over and grade the bottom.





Train Loops

Within each working section of the mine a regular train haulage loop is established to connect the main haulageways. On the main haulage line outside of the section, the radius of curves is never less than 288 feet. But inside a working mine section where loops are established to gather ore at conveyor loading points, a minimum curve radius of 70 or 80 feet may be used depending on conditions.

Mobile conveyors mounted on rubber tires are spaced at intervals around the section haulage loop at positions according to the work being carried on. A seven-car train of empties is trammed from the shaft to a conveyor loading point by one 15-ton trolley locomotive. Each car, which is of low headroom construction, has a total carrying capacity of 17 tons of ore. The locomotive is uncoupled and the lead car in the string is attached to a wire rope leading to a remote-controlled tugger.

The conveyors load the Watt mine cars directly, and the entire operation of car-loading and car-spotting is

regulated by shuttle car operations. When a loaded shuttle car reaches the conveyor station, the operator starts the mobile conveyor and the unloading flights in the bottom of his shuttle car. Within easy reach is a switch controlling the tugger which moves the string of cars. Each mine car will hold two loads from a shuttle car. When a car is filled, the string is moved ahead to spot an empty under the mobile conveyor. The loaded train of seven cars is picked up by a tandem trolley locomotive consisting of two 15-ton Westinghouse motors. The track used is 60- and 80-pound rail spaced on a 48-inch gauge. The heavier rail is used on all main lines.

Traffic Control

Mine Safety Appliance minephones are installed on all locomotives so that all motormen can maintain constant contact with one another. Track jeeps also are equipped with mine phones. An elaborate system of signal lights is also working for the trainmen. All track and derail switches on the main line are electrically operated by using Cheatham electric switch throws. These switches are operated through a trolley-contactor switch which energizes a circuit causing the track or derail switch to open or close.

At each switch electric warning lights are placed. A red light indicates that a switch is open and the green light shows that the switch is closed. In addition several derail switches have been installed along the main line to guard against the hazard of run-aways on the steep grades. Derail signal lights are marked with the word "derail" so that motormen won't confuse a regular track switch signal with a derail signal.

Block Signals

As an additional safety factor, the company has developed an electric, block-signal system which is simple and efficient. At intervals of about 2,000 feet along the main line, and at turnouts from the main line, a set of signal lights are installed. As a train enters the block, a trolley contact switch turns each signal in the block to red. These signals are also marked by a sign to aid motormen. This system has operated satisfactorily and with a minimum amount of trouble.

Automatic Hoisting

After a loaded train has reached the Number 1 shaft, the cars are emptied one at a time in a rotary

Continued on page 87 (WM71)

LOADERS are mounted on crawler tracks and crowd into the muck pile. Gathering arms drag ore to the chain conveyor which elevates and drops ore into waiting shuttle car. Each loader operates with two shuttle cars.

MINE CARS are loaded from mobile conveyor points spotted around haulage loop in a working mine section. The cars carry a 17-ton payload and are hauled in strings of seven cars by electric locomotive to hoisting shaft.

ROTARY DUMPER at Number 1 shaft empties the cars loaded with potash ore into crusher pocket. Total time for dumping seven car train is 10 minutes. Cars are equipped with rotary couplings to speed dumping.

OTANMÄKI

Discovery and Mining Methods at Finland's Largest Fe-Ti-V Mine

By ILMARI HARKI
Managing Director

Otanmäki is almost at the geographical center of Finland on the southern side of Lake Oulunjärvi 300 miles north of the capital, Helsinki.

Since the discovery of the titanium-iron ore, only 18 years have elapsed; yet the name of Otanmäki is now quite well known in Finland and in the mining world. From the beginning of the exploration, Otanmäki has been a subject of general interest—and also of controversy. The interest has been both geological and economic; the controversy mainly concerned commercial problems.

Both trial mining and trial concentrating plant tests, however, yielded affirmative results. Also the continuing geological investigation began to take the starting of mining operations for granted. In addition, World War II and postwar time clearly indicated that the Finnish raw-materials base was too one-sidely on timber. For these reasons the Finnish government, in 1951, made its final decision to begin mining operations at Otanmäki. The first aim of annual production was set at 500,000 to 600,000 tons of ore, corresponding to about 250,000 tons of combined magnetite and ilmenite concentrates.

The Otanmäki Company, which is owned entirely by the government, undertook a major project. In a short time, it had to establish, in the mid-

dle of a swamp and forest, a large mining plant, and a modern community. Simultaneously the government began the construction of a railway branch from the principal Iisalmi-Kajaani railway line to the mine, 15 miles in length. In two and a half years the mine, mill, and auxiliary works were completed. Normal production, according to plan, was reached in second half of 1954.

The total cost of all facilities (excluding the railway branch line) and of the entirely mechanized wharf for the shipping of the concentrate at Oulu (approximately 170 miles by rail from Ontamäki, on the Bothnian Gulf) amounted to about 3,000,000 Finnish marks (about $13,000,000). The total company staff is about 350 persons. The community at Otanmäki comprises 1,500 inhabitants; they all get their livelihood, directly or indirectly, from the mining company.

What's Ahead From Otanmäki

Watch for the complete details, as written by the company's staff engineers exclusively for MINING WORLD covering:

MILLING—This is one of only three mills in the world concentrating this type magnetite-ilmenite ore. Special details are given on magnetic concentration, cyclone operation, and most importantly—ilmenite flotation.

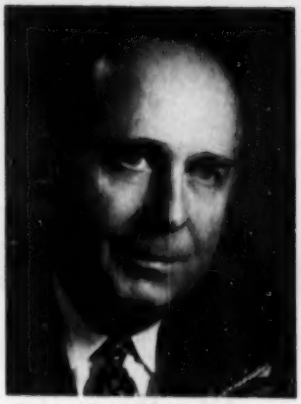
VANADIUM RECOVERY—A new process has been developed to recover 0.5 percent vanadium from magnetite concentrate. This makes Otanmäki the first large European vanadium producer.

From the technical production point of view, one can conclude with satisfaction that all the figures used in the early calculations, and on which the decision to start mining operations was based, have been confirmed by actual records, and have even been exceeded. The almost negligible phosphorous-content (a trace) of the magnetite concentrate has already drawn favorable results in the markets; its high content in vanadium (0.6 percent V), on the other hand, has attracted the company's research staff.

In this connection, I especially will mention the role of Professor Kauko Järvinen, a member of the board of directors of the company, in solving the problems of Otanmäki. Since the beginning of the prospecting, he has taken the lead. Being the technical adviser of the managing director, he has been in charge of the planning and development of the mine. In the same position, Professor Järvinen is still closely linked to the new projects for the further development of the Otanmäki Company.

These Men Made A Mine From Otanmaki Wilderness

PENNA TERVO
President



ILMARI HARKI
Chairman, Managing Director

UOLEVI RAADE
Vice Chairman

VOITTO KOLHO
Member of Board

TOIVO TAKKI
Member of Board

KAUKO JARVINEN
Member of Board

OTANMÄKI is now a model community which was established in the middle of swamps and forests. Employees' apartment buildings are in the foreground with the concrete mine headframe and mill buildings at upper right.

Magnetite-Ilmenite Lenses Occur In Anorthosite Along Amphibolite Contact

By HEIKKI PAARMA
Chief Geologist

Several boulders of ore-grade titaniferrous iron were found in the summer of 1937 at Sukeva (about 45 kilometers ssw from the town of Kajaani) by the Finnish Geological Survey. Search for the matrix rock, uncovered a magnetic anomaly in the summer of 1938 at Otanmäki, about 60 kilometers nw from Sukeva, by Veikko Okko, pleistocene geologist of the Geological Survey. Consequently, the investigations were transferred to the Otanmäki region. That summer the deposits of Otanmäki and Vuorokas were found and measured magnetically. Besides these two deposits, smaller magnetic indications were detected in 1940 at Pentinpuro and Itäranta (fig. 1). The Geological Survey started drilling at Otanmäki in 1939. From 1940 on, the work was continued on a larger scale by Suomen Malmi Oy.

Research carried out by several commissions, was favorable and the firm, Otanmäki Oy, was established in 1950 to mine the ore deposit. Construction work on the mill and subsidiary plants, as well as the housing area, began in 1951. Mining operations first started at the Otanmäki deposit and simultaneously general investigations, by means of diamond drilling, have been carried on in the Vuorokas area, about three kilometers east of Otanmäki.

General Geological Features

The following description is limited to the geology of the main deposit, i.e. Otanmäki, which is the only one sufficiently known. According to present knowledge of the main ore deposit, the appearance and structure of the other ore deposits would seem to resemble that of Otanmäki.

The Otanmäki deposit extends as an east-western zone about two kilometers in length. At its eastern end the zone forms a semicircle. To the west the extension of the zone is little known. A couple of smaller magnetic anomalies occur within the circle.

In the petrographical sense, the few principal rock types do not create any difficulties in the geological mapping of the area. However, the great inhomogeneity of the rocks in the middle part of the deposit and in its immediate vicinity is a typical feature of the complex. This feature, which can also be observed in detail, is not revealed in the appended map where the following principal geological features are indicated.

South of the western end of the mineralized zone there appears a rather large gabbro formation. Its extent eastward is unknown, as also is its connection with the ore zone in that direction. It should be mentioned that at Vuorokas a similar gabbro lens has been found apparently in a geological position comparable with that at Otanmäki.

The main rock inside the circle is an amphibolite which forms part of a great, gently arching curve of the amphibolite series. Identical with this amphibolite are probably the amphibolite sequences to which (or to the border zones of which) the other deposits (Vuorokas, Pentinpuro, Itäranta) are connected.

The anorthosite, an important rock type as far as the deposit is concerned, appears as continuous conforming lenses in the innermost border of the curve. This feature has best been shown in the northeastern part of the area by means of outcrop mapping and deep drilling.

Another critical rock type, the schistose hornblende rock, does not form continuous layers. It belongs, however, as a typical part to the nonhomogeneous zone composed of ores, anorthosites, amphibolite inter-layers, gabbro lumps, and mixtures of all these types.

Ore Deposit

The geologic map shows the known ore lenses of the plus 125 level. It should be borne in mind that not all the ore lenses are exposed at the surface; there are evidences of ore lenses not penetrating even to the plus 125 level. Such lenses have not been projected on the appended map. It has been estimated by means of magnetic measurements that the whole zone, including the parallel ore deposits, extends to a depth of 550 meters on the average. The largest lenses are about 300 meters long with the useful width varying from four to 20 meters. The dip is steep, south in the northeastern area but vertical or nearly so in the western part.

The ores of good grade (chlorite-based, see later) in many cases are situated at the contact of amphibolite and anorthosite. The contact against amphibolite is rather clear. The ore contact on the anorthosite side, on the other hand, may even be breccia-like.

The ore contains anorthosite inclusions in abundance and has been intruded into the interstices of the broken anorthositic country rock. In the opinion of the author, the great differences in plasticity at the contact of the anorthosite and amphibolite caused the break along the contact and permitted the intrusion of the ore. The contact phenomenon, discussed above, is important for mining operations.

Mineral Composition of Ore

The recrystallization caused by intense metamorphism is characteristic of the rocks of the whole area and also may be observed in the micro-structure of the ore. The essential minerals, magnetite and ilmenite, appear as independent grains easily separable from each other in the concentration process. Intergrowth has not occurred in the ilmenite-magnetite system. In ilmenite there appear hematite intergrowths, which in some places may be abundant. The mineral composition of the ore is quite inconstant. The pyrite content is 1.0 to 2.0 percent.

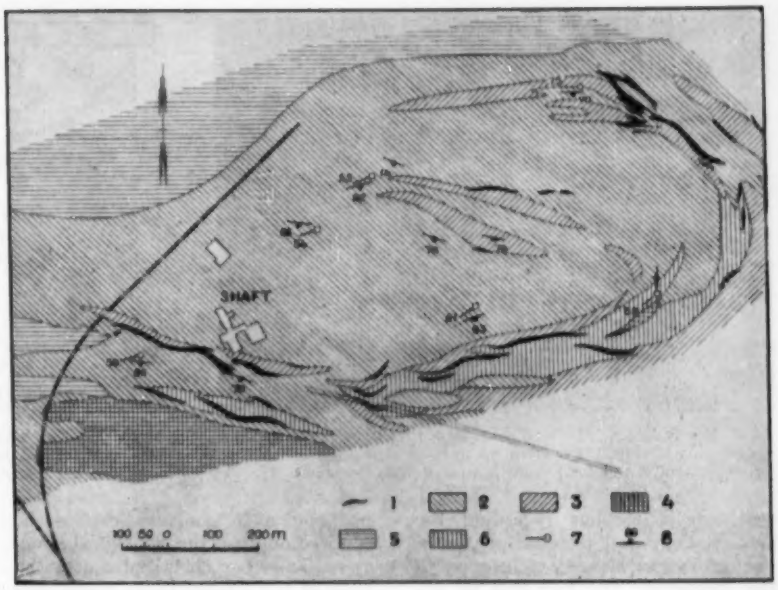
The main gangue minerals are chlorite, hornblende, and basic plagioclase. With regard to the subordinate minerals, there are distinct dissimilarities in different ore types. The high-quality ore comprises chlorite almost exclusively, it being primary in the ore. Under the microscope it is fairly clean, sometimes showing a peculiar gridiron structure caused by polysynthetic twinning. The low-grade ore contains hornblende, chlorite, and feldspar in varying amounts. There is a continuous sequence from ore to the hornblende schist. The lowest grade ore contains only an ilmenite impregnation. As accessories, there are spinel and sphene. Noteworthy is the occurrence of the complex ilmenite-titanite, which is rarely encountered.

The following percent analyses of the pure concentrates give a more exact chemical picture:

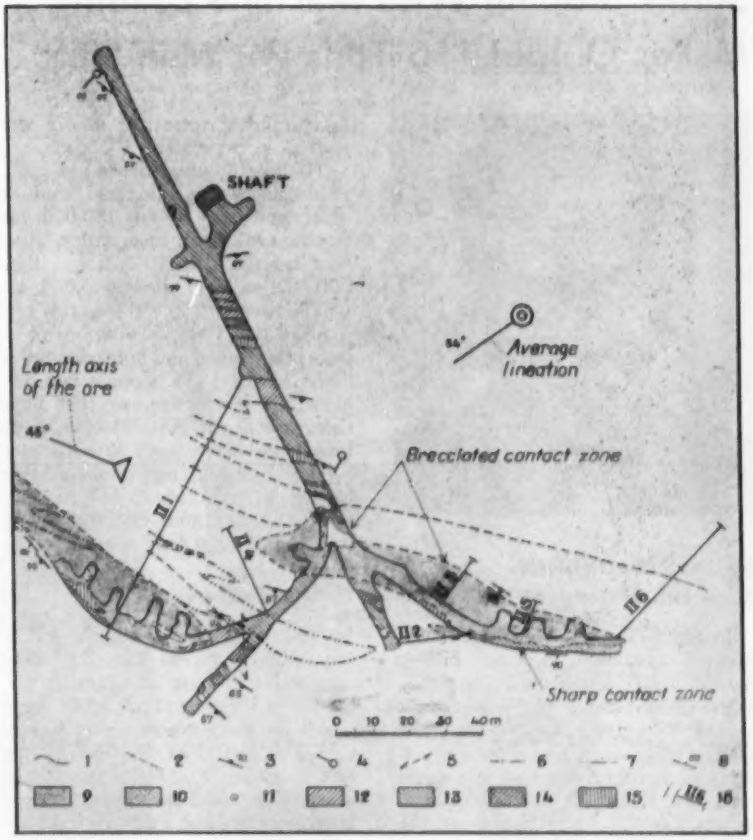
Constituent	*Magnetite Concentrate*	*Ilmenite Concentrate*	*Pyrite Concentrate*
Fe_2O_3	61.0	10.0	—
FeO	34.7	39.9	—
TiO_2	1.7	47.9	2.9
V_2O_5	0.80	0.24	—
Fe	(69.7)	(38.0)	(43.6)
S	0.12	0.08	47.0
SiO_2	0.52	0.88	2.3
Cr_2O_3	0.01	0.01	—
Al_2O_3	0.50	0.53	0.73
NiO	0.01	0.04	0.15
NnO	0.04	0.70	—
CaO	0.20	0.30	0.42
MgO	0.31	1.10	0.57
Co	0.01	—	0.71
Cu	—	—	0.59
P	0.01	—	—
As	—	—	0.07
Totals	99.0	101.7	99.7

Ore Genesis

As the investigations of the Otanmäki deposit are still incomplete, it would be premature to draw far-

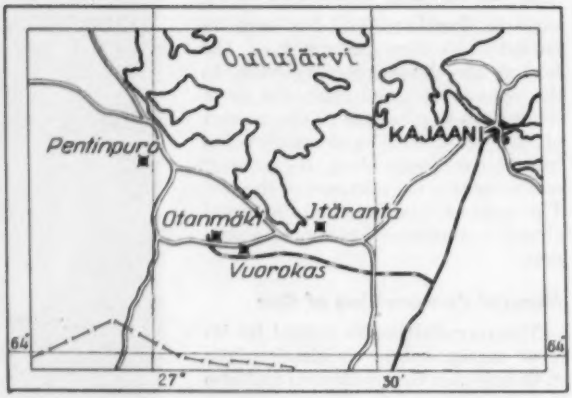


OTANMÄKI GEOLOGY: Numbers refer to legend. 1) Ore, 2) Amphibolite, 3) Anorthosite, 4) Gabbro, 5) Granite, 6) Hetrogeneous zone, 7) Lineation, 8) Stripe-dip of formation.



GEOLOGIC MAP of 125-meter level. 1) Contact, 2) Probable contact, 3) Strike and dip of foliation, 4) Lineation, 5) Fault, 6) Outline of ore on 175 meter level, 7) Location of ore on 75 meter level, 8) Dip of ore, 9) Ore, 10) Ore and schist, 11) Anorthosite fragments in ore, 12) Anorthosite, 13) Amphibolite, 14) Gabbroic amphibolite, 15) Ore amphibolite, and 16) Drill hole.

ORE HAS BEEN INTRUDED into the broken interstices of the anorthosite as shown in this picture. Ore intrusion apparently followed anorthosite-amphibolite contact.



MAGNETIC PROSPECTING located four anomalies which proved to be buried magnetite-ilmenite deposits. Otanmaki was the first discovered and is the only one now being mined.

reaching conclusions regarding the age relations and tectonic phases of the country rock or its connection to the formation. The fact that no explanation even for the most important phenomena is available justifies the supposition that the geological processes are rather complicated. On the basis of the investigations made during the mining operations, the intrusive nature of the ore may be considered as the only established observation. Possibly this explanation does not hold in regard to the low-grade, stratified ores.

Shrink Stoping With Machine Loading Makes Output 146 Tons Per Man Shift

By JARMO SOININEN
Mine Superintendent

In the spring of 1951 when it was decided definitely to start mining the Otanmäki ore bodies, there was, at the present site, a prospecting shaft to the 100-meter level. From the shaft, a single-track prospecting crosscut had been driven to the nearest lens, and along it for about 500 meters.

Sinking of the shaft was started in April 1951 and the present depth, 305 meters, was reached in June 1952. Mounting of hoisting apparatus was completed at year's end and preliminary mining operations in ore were started in September 1953.

The total tonnage hoisted in 1953—predominantly waste rock from development—was about 130,000 tons (metric tons in all cases unless otherwise specified). In 1954 it was about 500,000; in 1955 about 640,000; and will increase to 750,000 tons this year.

Since July 1954, 50,000 tons of ore have been stoped and hoisted monthly. Since March 1954, stoping has been ahead of production, so that today there are about 600,000 tons of ore broken in stopes ready to be hoisted.

The shaft and hoisting equipment have a designed capacity for handling 800,000 annual tons—630,000 tons of ore and 170,000 tons of waste.

Special Features

The Otanmäki mine has the following special features: The distribution of the lenses over a zone 2.0 kilometers in length and 0.2 kilometer in width on the surface; lenses are assumed to extend as deep as 550 meters. For each 1,000,000 tons stoped, the haulage ways must be driven 1.5 kilometers and the auxiliary ways and raises required by this stoping about 3.0 kilometers. Haulage ways are of remarkable length and neither stoping nor loading can be so centralized as to permit extensive mechanization.

The high-strength properties of both ore and waste rock, though the ore or rock is not especially abrasive. Because of these strength-properties, it is possible to make and leave hanging walls without timbering or filling. The rate of drill penetration is good, and blasting powder factors medium.

Stoping and Loading

Overhand stoping without filling is the mining system. In the large ore lenses, the maximum stope length is 100 meters and the width 15 to 20. In the smaller lenses, stopes are 30 to 60 meters long and 5 to 8 wide. Ore is broken with ammonium nitrate powder fired by millisecond delay caps. Powder consumption is 0.31 pound per ton in stopes and 0.09 in secondary blasting at loader draw points. From 100 to 160 tons are broken per manshift. Four to six tons of ore are broken per meter of hole drilled. From 100 to 140 grams of powder are used per ton of ore broken in stopes. Secondary blasting uses from 20 to 40.

Ore is loaded from draw holes at the end of crosscuts which are driven at right angles to the haulage way at 10-meter intervals. Salzgitter HL-400 mucking machines load into Granby type cars on the main haulage line. A locomotive in the middle of a string of cars simultaneously spots cars for two muckers. Large boulders plugging the draw points or too large

for the machines are drilled and blasted by mucking machine operator.

Equipment and Methods

Hoisting: The shaft is situated about 100 meters north of the ore zone at a place where the ore-ton-kilometers of the whole ore body to a depth of 500 meters may be assumed to approach the minimum.

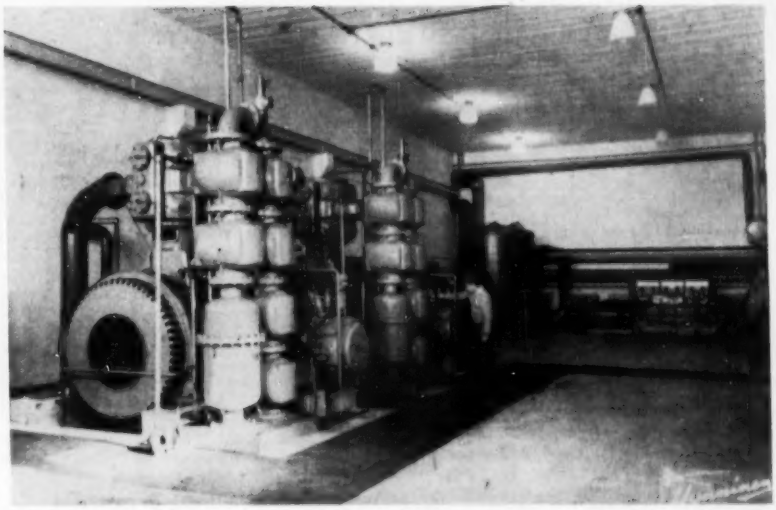
The shaft is a rectangle, 5.5 by 3.5 meters, divided into five sections: Two for ore hoisting skips, two for the cage and its "dead" counterweight, and one for the manway and the required pipes and cables.

The ore hoist is a Koepe type with a hoisting speed of 6.25 meters per second and a useful load of 6.5 tons. It has a single-rope driving sheave. Ore is hoisted from the 275-meter level to a pocket at the minus-1-level in the headframe. Hoisting capacity is 250 to 300 tons per hour. The motor is 560 kw and 3,000 volts. The hoisting of ore takes from 1.25 to 1.50 kwh per ton.

The personnel hoist is also a Koepe with a two-rope driving sheave.

Both hoists are in the top of a concrete headframe on the minus-29-meter level and were built for hoisting from a maximum depth of over 500 meters.

Haulage: The haulage levels are spaced at 50-meter vertical intervals at the 75-, 125-, 175-, and 225-meter levels. Double track haulage crosscuts, 4.5 meters (width) by 3.0 meters (height), lead from the shaft to the ore zone where they branch into 3-by 3-meter haulageways to the west, south, and east. The haulage ways are driven on 0.3 percent grade and the curve radius is at least 20 meters. The gauge is 29 inches, the weight of the rail 30 kilograms per meter, and the cross sectional area of the trolley wire 100 square millimeters. The diameter of the compressed air line on the haulage levels is 6 inch and the drilling water pipe 2 inch.



COMPRESSED AIR for mining use is delivered by these two, Atlas, 50-cubic-meter-per-minute machines. Cooling water from the compressors is used for heating the change house and for hot water for washing purposes at all mine installations.

The mine haulage equipment consists of three 8-ton trolley locomotives and two 4-ton gathering locomotives.

The mine cars are 30 granby type (4 cubic meter) and five V-body cars (1 cubic meter); the former for shovel loading, and the latter for mucking by hand. The Granby cars are dumped on each level by means of compressed air cylinders into a chute-raise system ending in a chute at the 225-meter level.

Underground crushing: The chute-raise-system is tortuous and has an angle of 55° so that, at each haulage level, there is a change of direction. The opening from the car dumps into the chute-raise is vertical and during emptying of the chute-raise-system the ore from these vertical parts runs down first.

The chute gate on the 225-meter level is operated by compressed air cylinders and delivers ore into the 200-ton chute feeding the jaw crusher.

The jaw crusher at the 240-meter level has a mouth measuring 37 by 49 inches. There is no grizzly in the mine; the size of the feed is regulated by the mucking machines. The jaw crusher has a Ross-type chain feeder and the angle of the feeding chute is 45°. The product size is 8 inches. The crusher is a "Schlagbrecher" type and its capacity 300 to 400 tons per hour depending upon the size of the feed. The number of strokes per minute in the crusher is 295 and it is powered by a 145-kw, low-starting current motor with V-belt transmission. The crushed material, either ore or waste, drops into a pocket of 1,000-ton capacity between the 240 and 275 meter levels. From there it is channeled through compressed air operated gates into loading boxes and from these

AIR CYLINDERS dump the four-cubic-meter-capacity, Granby-type, cars at each level's main transfer raise. All ore gravitates through chute-raises to the main crushing station.

MUCKING MACHINES load all ore from stopes. They operate in transverse crosscuts at right angles to main haulage. Picture shows size of ore loaded directly into four-meter cars.

Table No. I

Distribution of Otanmäki Mine Personnel in 1954 and 1955

Quality of personnel or work	1954 Number	1954 Percent	1955 Number	1955 Percent
Engineers	2		2	
Geologists	2		3	
Foremen	9		10	
Office	4		4	
Total official personnel	17		19	
Miners in drilling and charging	47	35.4	30	25.2
— loading and traction	32	24.0	34	28.6
— structures and repairs	10	7.5	8	6.7
— prospecting and surveying	10	7.5	13	10.9
— reconditioning and maintenance	9	6.8	10	8.4
— hoisting, caretaking etc.	8	6.0	8	6.7
— other works	11	8.3	12	10.1
Total miners at work	127	95.5	115	96.6
Miners absent for sickness etc.	6	4.5	4	3.4
Total miners	133	100.0	119	100.0
Total personnel in mining department	150		138	

Table No. II

Distribution of Electricity Consumption in Otanmäki Mining Department in 1954 and 1955

Operation	1954 kwh per Ton Hoisted	1954 Percent	1955 kwh per Ton Hoisted	1955 Percent
Compressed air	4.0	53.3	3.82	55.4
Ore hoisting	1.25	16.7	1.43	20.7
Personnel hoisting	0.20	2.7	0.16	2.3
Drainage (pumps and ventilation)	0.35	4.7	0.71	10.3
Crushing underground	0.65	8.7	0.19	2.7
Trolley locomotives	0.15	2.0	0.19	2.7
Locomotives (recharging)	0.10	1.3	0.03	0.4
Cap lamps (recharging) and change house	0.05	0.6	0.02	0.3
Other	0.75	10.0	0.35	5.2
Total	7.5	100.0	6.90	100.0

*1 shift = 8 hours. For example 3,670[2] = 3,670 shifts and 2 hours.

Table No. III

Otanmäki Stoping and Loading Efficiency in 1954 and 1955

	1954	1955
Tons of ore stoped	507,080	973,380
Drilling and blasting shifts and hours*	3,670[2]	5,885[4]
Scaling shifts	925[2]	539[4]
Other shifts in stoping	305[2]	211[2]
Total shifts in stoping	4,900[7]	6,636[2]
Stoped tons per manshift	103.5	146.7
Drilled meters	123,558	193,413
Stoped tons per meter drilled	4.10	5.03
Explosives kilogram	66,151	102,917
Stoped tons per kilogram explosives	7.67	9.46
Tons of ore loaded from stopes in 1954-1955	369,510	535,855
Shovel loading shifts with incidental works	1,962[2]	3,061[7]
Loaded tons per loadershift	183.6	175.0

Table No. IV

Otanmäki Mining Capacties in 1954 and 1955

	1954	1955
Driven raises, haulage ways, and other tunnels in 1954, in meters	4,045.6	3,741.4
Tons from these works	143,045	103,910
Total manshifts in these operations	15,006[1]	10,906[2]
Tons stoped (with tons stored in the mine)	507,080	973,380
Total manshifts in stoping (without loading from stopes)	4,900[7]	6,636[2]
Hoisted tons	503,800	638,960
Total manshifts in loading from stopes, haulage, drainage, hoisting, reparations, maintenance, etc.	14,568[7]	14,756[4]
Total manshifts in mining department	34,475[7]	32,299[9]
Hoisted tons per manshift in mining department	14.61	19.78
Total manshifts underground	31,060[9]	29,039[4]
Hoisted tons per manshift underground	16.22	22.00

through compressed air hatches into bottom dumped ore skips.

Mine drainage: At the crusher level there is space for a reserve crusher. Between this site and the nearest haulage level, 225 meters, is a water sump of 900-cubic meter capacity. The water from all higher levels is conducted into it by a galvanized 4 inch pipe. The pumping plant is completely automatic and equipped with water-level relays. The pumps are 6-stage centrifugals with a capacity of 500 liters per minute against the 260-meter head. The sump pumps are electrical, fully automatic, of the Bulldozer-jet injection type.

Compressed air: The compressed air requirement of the mine is met by two 50-cubic meter-per-minute piston compressors with synchronous motor drive and such aftercoolers as provide cooling water at plus 60° C. This warm water is used for heating the change house, and for washing purposes in the entire Otanmäki industrial area. The compressed air pipe from the compressors to the shaft and down the shaft is 8 inch with all-welded seams.

Electricity: The current supplying the underground mine is 3,000 volts. On each level, near the shaft, there is a 3000/400/231-volt transformer station and at the 175 level a 250-volt 400-ampere rectifier station for trolley locomotives. The same station, having a selenium rectifier, supplies the three highest levels. For the gathering locomotives there are small recharging rectifiers.

Drilling: The rock drills have a 2½- or 3-inch piston and are equipped with airlegs or raise pusher. Drill steel with tungsten-carbide inserts is used. Maximum hole depth is 4 meters. The rate of penetration of a 34-millimeter drill to 30 to 35 centimeters per minute in ore and 20 to 25 centimeters per minute in waste rock. Drill steel with inserts averages 200 meters before it is drilled to destruction. There is no diametric wear.

Loading: All loading is with mucking machines driven by compressed air. Their weight is about 6,400 kilograms. A shovel reinforced with hardfacing will stand 10,000 tons of loading before it needs complete reconditioning and new hardfacing. Chain or cable breakage occurs about once in every 5,000 tons loaded. Loading in drifts with dumping and other incidental work by the operator totals about 50 tons per shift. Loading from the stope crosscuts with block holing and blasting, dumping, and other incidental work is about 190 tons per shift. The net loading capacity of the machine, without incidental operations, from the stope crosscuts is 50 to 60 tons per hour.

United States

Personalities in the News

Howard C. Brooks has been added to the staff of the State of Oregon Department of Geology and Mineral Industries. The last session of the state legislature authorized this post of second geologist because of the increase in exploration for uranium, oil, and gas, and work on the state geologic map in eastern Oregon. Mr. Brooks has been an assistant in the analytical laboratory of the State of Nevada Bureau of Mines and a geologist with Westvaco Chemical Company.

E. G. Sunday, Jr., former chief engineer for Hanna Nickel Smelting Company, has accepted a position with American Metals Company.

Douglas D. Donald is a new member of the staff of Behre Dolbear & Company, Inc., mining, geological, and metallurgical consultants of New York. Mr. Donald spent the last five years with the New Jersey Zinc Company at Austinville, Virginia, starting in development engineering and later becoming chief mining engineer.

F. G. Michels, safety director of the North Range Mining Company at Negaunee, Michigan, was chosen to be president of the Lake Superior Mines Safety Council at the annual conference recently. The new vice president is **A. J. Stromquist**, safety director of Cleveland-Cliffs Iron Company, Negaunee.

James W. Cooksey, Jr. and **George W. Fischer** are recent additions to the mine engineering staff of International Minerals & Chemical Corporation's Potash Division at Carlsbad, New Mexico.

E. J. Baker, manager of the Rochester, New York district of the Federated Metals Division, American Smelting and Refining Company, will take over chairmanship of the Rochester Chapter of the American Foundrymen's Society.

Julius B. Haffner, president of the International Metals and Oil Corporation, was presented with an honorary degree of Doctor of Science by the University of Idaho at its 61st commencement exercises recently. The degree was conferred on Mr. Haffner in recognition of his "outstanding contributions to the Minerals industry and for his advancement of the State of Idaho". His professional achievements include presidencies of Bunker Hill and Sullivan Mining and Concentrating Company, the Lead Industries Association, Silver Mountain Lead Mines, Inc., and the Idaho Mining Association.

Siegfried Muessig is in charge of a summer project of mapping mineral deposits and geology in Ferry County's Republic area, near Spokane, Washington. Mr. Muessig is a geologist from the United States Geological Survey's Claremont, California mineral deposits branch. Other geologists in the party are **James Quinlan**, Spokane; **Alan Disbrow**, Tintic, Utah; and **James Calkins**, Washington, D.C.

George B. Moran has joined Freeport Sulphur Company as vice president in charge of domestic and foreign sales. Before accepting this position with Freeport, Mr. Moran was a vice president of the Hanover Bank in New York.

MARLING J. ANKENY was nominated recently by President Eisenhower to fill the post of director of the U. S. Bureau of Mines, and will be sworn in following Senate confirmation. Mr. Ankeny, a safety director of the Bituminous Coal Operators Association since 1952, will succeed John F. Forbes, retired. From 1947 to 1952, Mr. Ankeny was chief of the Coal Mine Inspection Branch, U. S. Bureau of Mines.

Louis M. Halper was elected to succeed **A. E. Hurley** as president of the Pacific Uranium Mines Company. The company, incorporated in Nevada in 1932, has offices in Beverly Hills, California.

John B. Myers has been elected president of the Zonolite Company, operators of the world's largest vermiculite mine, near Libby Montana.

L. M. Becker, superintendent of the Tioga No. 2 and West Hill mines for Pickands Mather & Co., has been transferred to the general mining offices as operating assistant.

Dale J. Brown is the new safety director of Kennecott Copper Corporation's Nevada Mines Division. Mr. Brown has been employed by Kennecott for the past two years as safety engineer for the firm's reduction plant at McGill. He succeeds **Roger J. Howell**, who recently resigned.

Dr. J. Robert Van Pelt, president of the Montana School of Mines for the last five years, was named to succeed **Dr. Grover D. Dillman** as president of Michigan College of Mining and Technology at Houghton. He is a former technical director of the Museum of Science and Industry at Chicago, and came to Butte from Columbus, Ohio, where he had been a mining engineer and research executive. Dr. Dillman is retiring after serving as president since 1935.

C. E. Dickens has been appointed supervisor of personnel relations for the Minnesota Ore Division of Jones & Laughlin Steel Corporation, Virginia, Minnesota. **R. H. Hanson**, former supervisor, resigned to accept employment with Pickands Mather & Co. in Duluth, Minnesota.

Four engineers have been added to the staff of Rosiclare Works, Aluminum Company of America, Rosiclare, Illinois. **John P. Meador** comes to Rosiclare from the U.S. Atomic Energy Commission at Grand Junction, Colorado. **Ronald W. Sheafer** has been working for the Andes Copper Mining Company in Chile. **Lloyd A. Smith** has been with Alcoa's operations at Bauxite, Arkansas. The fourth new mining engineer is **Eldred Kraemer.**

R. W. Livingston will direct activities of the Minnesota Minerals Beneficiation Sub-section of AIME for the coming year. He replaces **John D. Boentje** as chairman. **Chelsea R. Phillips**, 1955 secretary-treasurer was moved up to the position of vice chairman, and **Leon D. Keller** was elected secretary-treasurer.

Walter R. Landwehr, chief geologist of the western mining department for American Smelting & Refining Company, Salt Lake City, received the honorary professional degree of geological engineer from the Montana School of Mines at the 56th annual commencement exercises in Butte, Montana. The University of Utah honored three alumni with similar honorary degrees. **S. K. Droubay**, general manager of United Park City Mines, Heber, Utah was awarded the professional degree of mining engineer. **Dean James Forrester** of the Idaho College of Mines of the University of Idaho at Moscow received the professional degree of geological

JACK B. KNAEBEL (left above), who has been Anaconda Company's manager of New Mexico Operations from the beginning of the company's uranium activities in 1951, has been named assistant to the vice president in charge of mining operations, with headquarters in New York. In addition to other duties, he will be responsible for the general direction of Anaconda's uranium operations. A. J. FITCH (second), previous assistant manager in New Mexico, will be the new manager. He has been with the Bluewater operation practically from the start and has contributed very substantially to its successful development. E. C. PETERSON (third), who was transferred from Montana to New Mexico as general mill superintendent late in 1954, has been promoted to assistant manager under Mr. Fitch. D. C. MATTHEWS (right) will continue as chief metallurgist at the Bluewater plant. He will work closely with Mr. Fitch and Mr. Peterson in connection with metallurgical problems and process control and will be given added responsibilities.

engineer, and **Wayne H. Burt**, assistant to the president of Kennecott Copper Corporation, the professional degree of mining engineer.

L. M. Becker has been transferred to the general mining office of Pickands Mather & Co., as operating assistant. He was previously superintendent of the Tioga No. 2 and West Hill mines on the Mesabi iron range.

V. A. Zandon, mill superintendent at Southwest Potash Corporation in Carlsbad, New Mexico, has moved up to the post of assistant general manager. **Frank Henderson** was appointed mill superintendent and **Arthur Sunde**, maintenance superintendent.

Thomas K. Graham has taken over new duties as manager, Raritan Copper Works, International Smelting and Refining Company at Perth Amboy, New Jersey. He succeeds **Lorin W. Kemp**, who retired after 42 years with this wholly-owned subsidiary of The Anaconda Company. Mr. Graham has been with Anaconda since 1935, most recently as superintendent of the Reduction Works at Great Falls, Montana.

Allison B. Stout has been named a technical assistant in the engineering department of the Hayden, Arizona plant, Ray Mines Division of Kennecott Copper Corporation. Mr. Stout had been service manager of Imported Motors, Inc. in Albuquerque. New Mexico.

Albert E. White, consulting metallurgical engineer and retired director of the Engineering Research Institute, was honored recently with a certificate of Honorary Membership in the American Society for Testing Materials. A leader in the field of metallurgical research, specifically metallurgy of metals for high-temperature service, Dr. White is the author of over 100 papers on research and metallurgical subjects.

GILBERT R. GRISWOLD, mining engineer, has been added to the firm of Chapman and Wood, consulting mining engineers and geologists of Albuquerque, New Mexico. Mr. Griswold has had wide experience in metallurgy and ore dressing including his position, for the last 10 years, as agent and manager of mineral rights, Ortiz mine grant, Santa Fe County, New Mexico. Previous to that he had a research fellowship to the University of Utah, Engineering Experiment Station, and was an engineering aide for the U. S. Soil Conservation Service in Utah.

Frank Amatuzio, formerly with Standard Salt & Cement, is now employed as a draftsman with Erie Mining Company in Duluth, Minnesota.

Cecil Fitch, Jr. was elected president and general manager of Chief Consolidated Mining Company, Salt Lake City, Utah, to succeed his father, **Cecil Fitch, Sr.**, retired.

Paul Dashine has stepped up from the job of industrial engineering manager to director of engineering for the Calumet division of the Calumet & Hecla, Inc. at Calumet, Michigan.

W. Lynn Hart has stepped up to the new position of director of personnel, safety, and training of the northwestern mining department of the American Smelting and Refining Company at Wallace, Idaho. Formerly Mr. Hart held the job of safety engineer. **Harry Nelson** will be personnel supervisor under Mr. Hart.

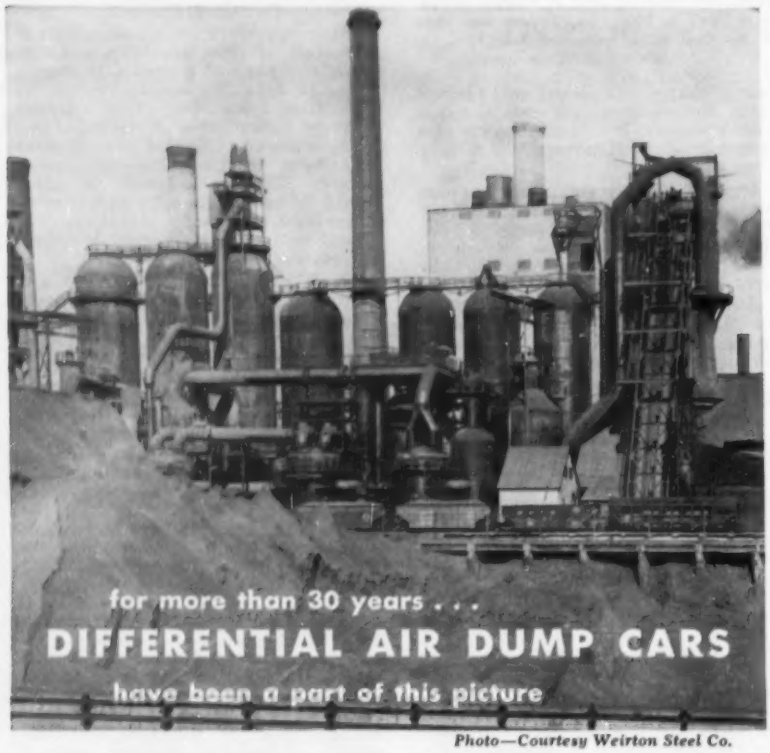
Kenneth E. Merklin, former district sales manager of Western Machinery Company, has resigned and accepted a position with the beneficiation department of Erie Mining Company, Hibbing, Minnesota.

Howard Wilmeth has been named mine engineer for Kennecott Copper Corporation's Chino Mines Division. Mr. Wilmeth replaces **W. W. Baltosser**, who has accepted an assignment with Bear Creek Mining Company, an exploration subsidiary of Kennecott.

Ezra S. Edwards has been chosen first vice president and field manager of the Valcada Mining Company at Hawthorne, Nevada.

A. A. Creech was elected president of the Big Eight Mining Corporation at the first annual meeting of the group in Boise, Idaho. Other officers are: **Bob Giest**, first vice president; **Wayne Miller**, second vice president; **Dale Chamberlin**, secretary; **Frank Roseberry**, assistant secretary; **Clyde W. Creech**, treasurer; and **Albert Jentzsch**, assistant treasurer.

Bruce Croft was named to replace **Frank Magda** as federal mica inspector at Custer, South Dakota. Mr. Magda will go to New York to work with the imported mica program. Mr. Croft has been an inspector of imports in New York since 1953.



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SINCE 1915 PIONEERS IN HAULAGE EQUIPMENT

Newsmakers in International Mining

FRANK PICKARD is the new general mines superintendent for American Metals Company, Ltd. at the Sabre-Pinon Mining Company, New Mexico. Mr. Pickard was formerly general sales manager of the Gregg Car Company in Brussels, Belgium, and, before that, mine superintendent of Tsumeb Corporation Ltd., Tsumeb, South West Africa.

Hernan Stiles Zuazo is the new president of Bolivia, replacing **Victor Paz Estenssoro.** Mr. Zuazo served as vice president during the Paz Estenssoro administration, which brought about nationalization of most of the Bolivian mines. News dispatches from La Paz, Bolivia predict that his election means a vigorous reorganization of the tin mines.

J. Forbes McFarland now occupies the newly created post of mining commissioner for Ontario, Canada. A veteran of 40 years with the Ontario Department of Mines, Mr McFarland turned over his position as chief of the mining lands branch to **Ralph V. Scott** who has been mining recorder at Toronto for six years. By naming Mr. McFarland mining commissioner, Ontario has eliminated its Mining Count.

Professor Hunkin of Melbourne University, Australia has been studying tin recovery in Cornwall while visiting England recently.

Artemois N. Anastassakis, inspector of mines for the Greek government, has been viewing mining methods in eastern United States for his country.

John R. Bartlett has left Aramayo de Mines en Bolivie as mill superintendent to become mill foreman at San Manuel Copper Corporation, San Manuel, Arizona.

Olof H. Odman, Professor in minerology and geology at the Royal Institute of Technology in Stockholm, Sweden, will work with the iron ore research and projecting department of the Grangesberg Mining Company starting this fall

C. T. Sweet has been chosen managing director of Knapp and Bates Ltd., ore dressing engineers of London. **E. A. Knapp,** former managing director, died early this year.

A five-man Soviet delegation headed by **Mr. Belltavsky,** vice minister for geology and mineral conservation, visited Tokyo, Japan recently to attend two subcommittee meetings of the United Nations Economic Commission for Asia and the Far East (ECAFE). About 50 experts from the United States, Burma, India, Japan, the Soviet Union, and other ECAFE member countries were present to compile a geological map of Asia and the Far East and to discuss the development of mineral resources

John Miller has returned to the United States from Monrovia, Liberia, West Africa where he was employed as excavation superintendent for the Liberian Mining Company of New York City.

Peter A Cain, mine superintendent, and **Ralph Mitchel,** chief engineer of Sherritt Gordon Mines, Ltd., Canada, have been studying Diesel and trackless equipment on a mining trip recently which included visits to The Eagle Picher Company in Oklahoma and St. Joseph Lead Company in Missouri.

Dr. K. F. G. Hosking of the Camborne School of Mines in England has been visiting Malaya in a consulting capacity.

Professor K. Rankama has been appointed president of the third Winter Conference of Northern geologists planned for 1958 in Helsinki, Finland. Official mailing address for the conference is Fil dr. J. Donner, Yliopiston Geologinen Laitos, Snellmannink. 5, Helinski, Finland.

Franc R. Joubin was 1956 recipient of the Leonard Medal presented at the annual convention of the Engineering Institute of Canada. The medal, highest award of the Institute for technical achievement in any one year, went to Mr. Joubin in 1955, also. He is well known for the leading part he played in the discovery and development of the Blind River uranium field.

B. D. Mellor is senior geologist for Territory Enterprises Ltd., Rum Jungle, Australia. **R. B. Leslie** has been appointed chief geologist, replacing **W. N. Thomas** who has gone to a newly created position of senior resident geologist at Consolidated Zinc Pty. Ltd. in the Northern Territory.

F. H. Grimes has been appointed works manager of English Clays, Lovering, Pochin & Company Ltd. in England.

Harry G. Gerber, general plant foreman for Erie Mining Company, has been named superintendent of the Hilton iron mines. The Hilton mining area is located 45 miles north of Ottawa, Canada.

M. M. AYCARDO, JR., (left) after 21 years as a mining engineer for A. Soriano and Company in the Philippines, has resigned and formed his own company, Mineral and Engineering Development Corporation, of which he is president and general manager. The new company will do exploration and consulting as well as mining design and construction work. ANSELMO CLAUDIO, JR. is the vice president, and the technical staff includes RAMON ABARQUEZ, CLEMENTE C. PUNO, JR., MARCIANO E. NATIVIDAD, and JONES R. CASTRO.

G. J. BRITTINGHAM, consulting metallurgical engineer, is presently engaged in work for the United Nations Korean Reconstruction Agency in connection with the rehabilitation of the Chang Hang customs smeltery and refinery of the Samsung Mining Company. He will be in Korea about two years. Mr. Brittingham was formerly a consulting engineer in New South Wales, Australia.

Nils E. Nilsen is a new board member of Western Uranium Mines N.L., Australia.

H. S. Anderson, former manager of the Arizona Continental Uranium Company, Inc., has been named resident engineer of the New York and Honduras Rosario Mining Company, with headquarters in New York City. Previous to his work with Arizona Continental, Mr. Anderson was assistant general manager of the Honduras operations of the New York and Honduras Rosario Mining Company.

T. W. Lean has been promoted to aluminum superintendent for the Australian Aluminum Production Commission at Bell Bay, Tasmania. He was formerly acting superintendent. **J. A. Finch,** formerly assistant production superintendent, is now production superintendent for the Commission.

T. Wakabayashi, mining engineer, is now associated with the milling department of Mitsubishi Metal Mining Company, Ltd., Tokyo, Japan.

E. C. Spalding, mining geologist for Cia. Minera Nacional, S.A., has been transferred from the Plomosas Unit at Chihuahua, Mexico to the Taxco Unit at Guerrero, Mexico.

F. S. Anderson is the new managing director of Sulphide Corporation Pty. Ltd., Titanium and Zirconium Industries Pty. Ltd., and Territory Enterprises Pty. Ltd., Australia.

L. W. Allen, former manager of Rhokana Corporation Ltd., Northern Rhodesia, has been appointed general manager of Nchanga Consolidated Copper Mines Ltd. He replaces **H. E. Nelems,** who has accepted a position in Canada. **G. S. Giles,** previously an assistant consulting engineer of the head office of Anglo American Corporation in Johannesburg, has taken over the job as manager of Rhokana Corporation Ltd.

Cerro de Pasco Corporation, major mining company with extensive properties in Peru, has granted post-graduate one-year scholarships in the United States to four Peruvians. The winners are **Marcial Garcia y Garcia, Hernando Arauco Fajardo, Julio Flores,** and **Adan Martinez Aguirre.** The program is designed to encourage advanced scientific and technical studies by the Corporation's Peruvian technicians. The four will first undergo an intensive orientation course for foreign students at the Colorado School of Mines at Golden.

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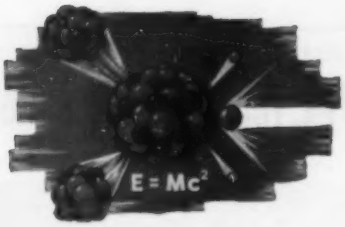

FISSION FACTS

Monthly Roundup of Mining News In the Atomic Energy Field

Ambrosia Lake . . .

Sleeping Uranium Giant on Verge of Mining Boom

Let's take a trip to the famous Ambrosia Lake uranium district northwest of Grants, New Mexico where some of the nation's most important uranium ore reserves have been developed in the last year.

We drive north from Grants toward San Mateo on a dust-pocket filled, rutted, heavily traveled road. As the car moves along, we see water tank trucks loading at wind mills and small wells. Loaded trucks pass us going north, and empty water tank trucks return south for water. We leave the San Mateo road and turn northwest across the flat prairie; suddenly a plane swoops down in front of the car and lands on an air-strip beside the road. Two geologists and engineers step out and walk to the east toward a drilling rig. They left their plush air conditioned office in Albuquerque only minutes before, and are making their daily check of drilling progress. Much has happened since their last inspection, as the drills work three shifts daily. The pilot stands by the plane polishing the propeller, awaiting the return of his passengers.

We continue on several miles to the north and come to the "camp." Here are 40 or more trailer houses parked adjacent to a windmill which has been the main source of water in the Ambrosia Lake area in the initial exploration period. A local rancher charges a stiff fee for parking a trailer, furnishing electricity, and drinking his water each month.

Driving on to the north we scan the horizon. Off to the east, the north, and to the west drill rigs are silhouetted against the sky. Suddenly we see a group of six rigs bunched together. Immediately we know that wild catting has found ore in one hole; the rigs are bunched close to the discovery and will be fanned out to delimit the ore body. Off to the northwest is a large, high, silver colored tank. It looks almost like a grain silo, but actually it is a water supply tank for use of one of the exploration companies. Water is trucked in from Grants by tanker.

Now, the road goes down over a rimrock into what is supposed to be Ambrosia Lake proper. Actually it is a grass covered bottom. Driving along one can see where hundreds and hundreds of holes have been drilled. There is a slight mound of cuttings at the collar of each. Long rows of cuttings are piled in order to show formation sequence. Some holes are 400 or 500 feet apart—wildcat holes. Many are 100 or 200 feet. When there is a great cluster of close holes on 50-foot centers we know there is an ore body below.

Suddenly, to the north, the 84-foot-high head frame of the Rio de Oro Uranium Mines, Inc. looms on the horizon. Soon a dump truck loaded with coal-black uranium ore passes. It is from Rio de Oro, the first company to sink a shaft and get into actual production from the fabulous Ambrosia Lake district. Rio de Oro has pioneered mining and answered a lot of questions about underground conditions to the satisfaction of other companies.

To the west is the bare outline of an old oil well derrick. It's Dysart No. 1, where Louis Lothmann, a psychologist, found uranium in April 1955 in cuttings from the dry hole drilled in the search for oil. Mr. Lothmann next drilled a series of holes to the north of the derrick toward where the Rio de Oro shaft is now, and found ore grade mineralization. The boom was on in mid-1955.

Today the road swings south. A sign near a gate bears the magic word "Sabre". Continuing to the south, holes get closer and closer. On this flank of the Ambrosia Lake dome are several small corrugated iron buildings and a drill hole with a deep well pump in it. The pump is operating and water flows from the well. This is the Sabre ore body where American Metals Company, Ltd. will sink one of its big deep new shafts.

We drive further south. Suddenly, off to the west, is a string of seven drill rigs. Kerr-McGee Oil Company is drilling that section.

The road continues toward Haystack Butte, where in 1950 Paddy Martinez, a Navajo Indian, found uranium.

We leave Ambrosia Lake, a sleeping giant. Exploration has passed its frenzied peak. Scheduled drilling extends to the east, west, and north. More discoveries are certain.

The sleeping giant lies under the unmerciful rays of the desert sun. It will come alive as the shaft sinking boom comes of age.

Improvement of existing roads is the first step in awakening the giant. New Mexico Highway 53 will be black-topped from its junction with U. S. 66, west of Grants, for about 20 miles to the north toward Ambrosia. Gravelled roads will be built in the Lake area proper.

Tomorrow may see a branch of the Santa Fe railroad reaching the major mines. Then, long strings of heavily loaded hopper-bottom cars will transport the uranium ore to the now planned cluster of mills west of Grants.

The hands of many men with modern machines are ready to awaken the giant—Ambrosia Lake uranium.

AMERICAN METALS will bring the Ambrosia Lake giant into production with a 800-foot shaft here at Sabre Uranium Corporation's camp. One hole cut 107 feet of 0.27 percent U_3O_8.

DRILL RIGS, five of them, on this section are typical of today's activity. Note the three rigs in a row at left center. Haystack Butte at top left is site of area's original discovery in 1950.

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Spain's Mineral Output Shows Upward Trend As Well Known Mines Are Being Mechanized

During the last few years the production of the Spanish mining industry has increased considerably despite the many government restrictions and the great need for up-to-date equipment and better transportation facilities. Since 1950, Spain has brought its output of iron ore up from 3,000,000 tons a year to 4,750,000 tons in 1955; iron pyrite from 1,500,000 to 2,043,728 tons; and lead from 40,000 to more than 61,000 tons.

In relation to the other principal activities of Spain, mining ranks high. In 1955 the exportation of ore and metals reached a value of 283,000,000 pesetas (over $27,000,000), more than 20 percent of the total Spanish exports.

Spain has long been master of the world mercury market. The largest producing mines, The Almadén, were operating many centuries before the Christian Era. The San Joaquin shaft at Almadén has just been extended to a depth of 450 meters and new equipment has been installed to meet the constantly increasing demand for this vital metal. In 1955, the value of exported mercury, from the Almadén mines alone, amounted to $8,570,000. Total Spanish mercury exports last year was 32,399 flasks.

Iron ore is one of the most important minerals to the Spanish mining industry. The 1955 production total of 4,750,000 tons was an increase of 17.80 percent over 1954. Exports amounted to 2,838,000 tons, compared to the previous year's 1,628,200 tons.

Deposits of iron ore are found chiefly in four zones. The North Zone, with its well known mines of Vizcaya and Santander that once furnished one-tenth of the world's iron production, is now suffering a scarcity of ore. An estimated 45,000,000 tons of siderite, containing a small percentage of red oxide, are still available; however, the high cost of extraction and its low value on the world market make it less profitable.

The North-West Zone includes the deposits of the provinces of Lugo, Asturian, and León. Rich ore bodies exist in Lugo, but many of them are so far from the railways that transportation is a great problem. The Asturian deposits, although they produce heavily, have such a poor and siliceous ore that it must be mixed with the Vizcaya mineral in the near-by furnaces. The province of León, however, has deposits which represent some of the most important reserves of iron ore in Spain. Coto Wagner has about 100,000,000 tons of very rich ore; its 1955 production of 182,000 tons is expected to be duplicated this year.

The East Zone contains an immense aggregation of hematite at Sierra Menera mines. The ore is transported 125 miles by a mining railway to the Sagunto plant, where it is sintered. A similar deposit is found at Moncayo, but the transportation problem exists there too.

The Southern Zone consists of the deposits of Granada, Sevilla, Almeria, and Badajoz. The most important are at Granada and Almeria with reserves of 50,000,000 tons of standard quality ore. The reserves of Sevilla and Badajoz are estimated at 15,000,000 tons; however, Badajoz also has transportation difficulties. In the region of Sierra Nevada (Granada) the Conjuro mine will soon start production of about 300,000 tons yearly.

Lead is found extensively in Spain, particularly in Jaén, Murcia, Santander, and Badajoz. Jaén had about 20 mines producing a total of 94,000 tons of ore last year. More could have been produced in that area, but the government reservations occupy some of the land and they have investigated less than one percent of this territory. The province of Murcia has increased output from 8,500 tons in 1950 to 21,000 in 1954. However, the lead is mainly from iron mining dumps.

Spain looks for an increase in lead production if the actual prices can be maintained and modern equipment procured.

The richest zinc producing zones in Spain are Santander and Murcia. In 1955 the output of zinc amounted to 165,000 tons, 75 percent from Santander. Spain is trying to expand export profit by converting the zinc ore to metal before exportation. Last year it would have represented about $23,000,000, instead of $7,400,000, if they could have supplied the metal instead of the ore. This will be partially remedied by the new Compania Espanola del Zinc (Spanish Zinc Company) plant in Cartagena, with a 40,000 ton capacity; soon to be increased to 80,000 tons.

La Sierra de Cartagena operations have been extremely successful, going from 3,600 tons of zinc ore 10 years ago, to over 60,000 in 1955.

The most extensive deposits of iron pyrite are to be found in the provinces of Huelva and Sevilla. An estimated 50 percent of the world's reserves are to be found underground in Spain. It is believed that production of iron pyrite will increase from the 1955 figure of 2,043,728 tons to almost double in the next few years.

World Geology Congress To Meet In Mexico City

A world symposium on manganese deposits, in which 54 scientists from 38 countries will present papers, will feature the 20th meeting of the International Geological Congress September 4 to 11 on the University City campus of the National University in Mexico City.

Some 1,594 geologists from all over the globe will attend the meeting, which will include the following sections: "Cenozoic and Mesozoic Vulcanology in the Western Hemisphere and Their International Correlations"; "Relations between Tectonics and Sedimentation"; "Modern Ideas about the Origin of Mineral Deposits"; "Plutonic Rocks, Their Origin and Relations with Tectonics"; "Applied Geophysics"; "Petrology and Mineralogy"; "Geochemistry"; "Geochemical Explorations and Isotopic Geology"; "Geology as Applied to Mining and Engineering", and "General Geology."

Simultaneously with the Congress, a number of other international geological organizations will convene in Mexico City. Among them are the African Geological Services Association, of London; the International Geological Map Association, of Paris; the International Paleontological Union, the Society of Economic Geologists, of New York; the International Stratigraphical Commission, the Terrestrial Surface Commission, of Belgium; the European Geological Map Commission, of Germany, and the International Committee for the Study of Clays, of the United States.

Construction Work Begins At Canadian Al Smelter

Construction of a 160,000-ton aluminum smelting works has begun at Baie Comeau in Quebec, Canada by Canadian British Aluminum, a subsidiary of British Aluminium Company, Ltd., of England. Anglin-Norcross Corporation, Ltd., and the Atlas Construction Company, Ltd. have contracted to do the job.

The plans at present call for completion of the first two of four stages of development of the smelter, each representing installation of 40,000 tons of capacity. When the company expands to full capacity, the project will cost around $130,000,000.

New power facilities, costing about $70,000,000 will be necessary to furnish electricity for the project. Quebec North Shore Paper Company will join in the development, and the Quebec Hydroelectric Commission will supply 2,000,000-horsepower of electric energy.

Nippon Signs Contract For Philippine Cu Ore

Nippon Mining Company Ltd. has signed a contract with the Philippine Mining & Development Company for the purchase of copper ore produced from the Sandmilio mine. The Saganoseki refinery of Nippon Mining has already received 2,000 tons of this ore. Both companies will continue negotiating regarding setting up of a joint development company for this mine some time in the future.

Along the same line, the Nippon firm has under consideration development of the Lupo copper mine on Cebu Island. The company has sent its survey staff, consisting of two mining engineers and a geologist, to inspect and survey both of these mines and will consider investing in a joint company with the owners if the mines show any potential.

Set International Mineral Congress For Stockholm

The International Mineral Dressing Congress is scheduled for Stockholm, Sweden from September 18 through 21, 1957. More than 25 mineral dressing papers will be read and discussed. About one half of the papers will be by Swedish, Norwegian, and Finnish authors. In connection with the Congress trips have been arranged to the larger Swedish mines, and others are planned to mines in Norway and Sweden.

The Congress is sponsored by the Svenska Gruvföreningen in association with the Jernkontoret and will be held at the Royal Institute of Technology. This is the fourth European meeting of the group which is dedicated to improving ore dressing practices. Earlier meetings were held in London in 1952, Paris in 1953, and Goslar in 1955.

John Hedlund of Stockholm has been delegated as Secretary General of the Congress.

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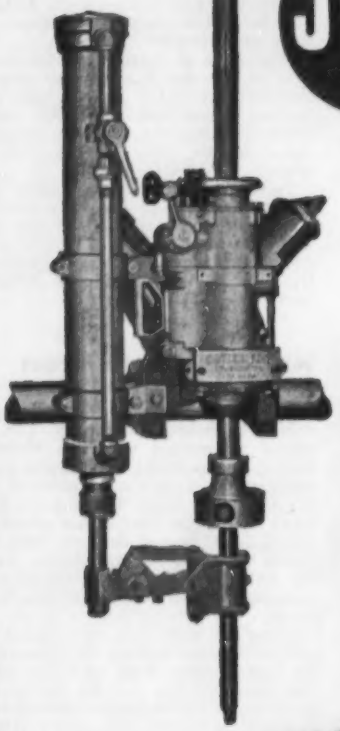

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QUEENSLAND – *Copper Refineries Pty. Ltd.* has been formed by *Mount Isa Mines Ltd.* to construct an electrolytic copper refinery at Townsville. The initial capacity is to be 30,000 tons per year (current Mount Isa output is somewhat over 20,000 tons annually). The new company will enter into a contract to refine Mount Isa blister which is now, in part, refined at Port Kembla, N.S.W., and partly overseas. Copper will be sold on the local market, unless there is a surplus, when it will be exported The refinery will be expanded as additional copper becomes available. (Blister copper from *Mount Morgan Ltd.* at Mount Morgan near Rockhampton, is refined at Port Kembla. This copper could be refined in the new refinery, if desired. The Mount Morgan blister carries several ounces of gold to the ton but Mount Isa blister has some ounces of silver and practically no gold.)

REPUBLIC OF THE PHILIPPINES– *Samar Mining Company*, managed by *Elizalde and Company*, reports that Japanese geologists and company mining experts have surveyed the firm's iron ore deposit in the Sibuguey area of Zamboanga. Prospecting is continuing and additional claims have been staked. The *Sibuguey* property is believed to contain enough reserves to last 20 to 30 years.

TASMANIA–*Rio Tinto Ltd.*, one of the world's largest mining groups, will make a comprehensive search for minerals in Tasmania. About one-fifth of the island is to be covered–that is, about 5,500 square miles–and reportedly a sum of £500,000 will be spent. Most likely area for mineral discoveries is western Tasmania, north of King River, but the wild area south of the King River is actually the least known portion of the Australian continent and could yield almost anything.

NORTHERN TERRITORY–The one-ton specimen of pitchblende hoisted from *United Uranium's El Sharana* mine assayed 80 percent uranium oxide and is believed to be the largest piece of pitchblende ever found in the world. There is a spectacular lens of pitchblende at the 57-foot level of the mine. Assays of the mineral recovered during driving are from 83 to 87 percent U_3O_8. Fifteen tons are stockpiled at the surface. Assays from all parts of the mine (which is small, as yet) show rich values between 0.6 and over 6.0 percent uranium oxide.

REPUBLIC OF THE PHILIPPINES –*Palawan Consolidated Mining Company* has completed the construction of a 14-kilometer road into its *Irahuan* chromite property in Puerto Princesa, Palawan. The pier and storage facilities have also been finished and regular production is underway. *Marsman and Company* are acting as agents for the property, and are in charge of all operations.

NORTHERN TERRITORY–*Uranium Development Prospecting N.L.* has received an offer of purchase for its *South Alligator River* area. Values showing the mine are extremely rich in pitchblende but patchy. Last September the firm negotiated with *North Australian Uranium Corporation N.L.* regarding an amalgamation of interest in the South Alligator River area but did not proceed with the proposal.

WESTERN AUSTRALIA – *Western Titanium N.L.* expects that its plant near Capel will begin production before the end of the year and that output will expand during the first quarter of next year. In addition to a recent acquisition of approximately 200 acres adjoining its northern boundary, in which an additional 750,000 tons of heavy minerals were proved by drilling, option rights are being arranged over 2,000 acres in which prospect drilling has indicated several million tons of payable ore reserves. (The Western Australia heavy mineral sands are predominantly ilmenite.) The company has made good progress in clearing the initial mining site, constructing a rail siding, roads, bridges, slime settling area, and water storage facilities. Plant buildings are being erected and most of the necessary mining equipment has been delivered.

REPUBLIC OF THE PHILIPPINES –Copper production in the Philippines is expected to double this year, and may well be one of the country's first five or six leading exports within the next year, replacing both iron ore and chrome ore. It has already replaced leaf tobacco as the tenth leading export product with shipments totaling Pesos 11,000,000 worth of copper concentrates in 1955 as compared with Pesos 5,000,000 worth of tobacco. Copper shipments were valued at Pesos 2,500,000 in 1954.

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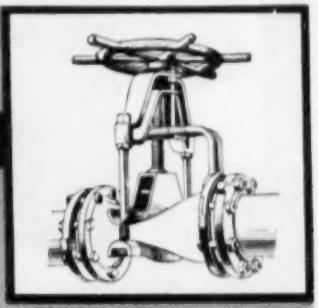

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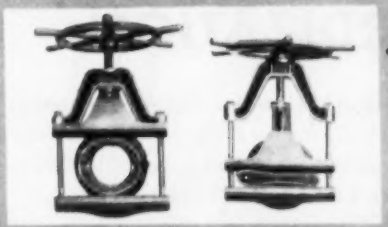

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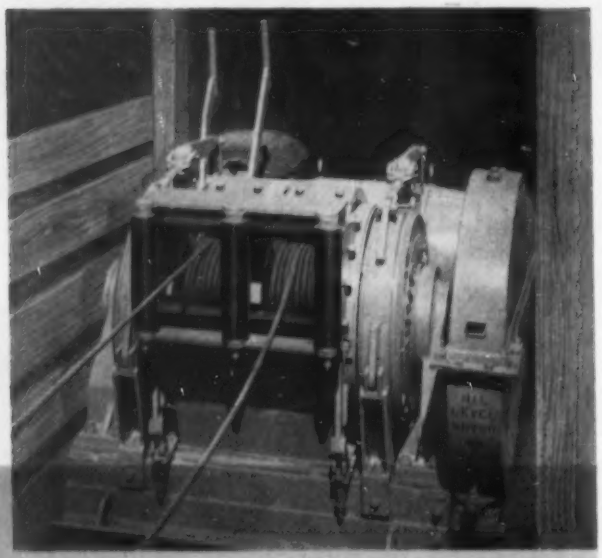

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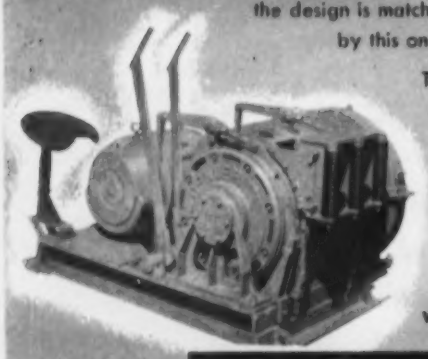

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INTERNATIONAL

BOLIVIA—The Bolivian government has approved a contract with the *South American Gold & Platinum Company* for the development of gold and platinum deposits in the Kaka River, province of Caupolican. The contract is reported to be for 25 years, with the company to pay a royalty of five percent on gross production, plus a fixed tax. The government will have an option to buy all or part of the production in dollars.

JAMAICA—*Alumina Jamaica Ltd.*, subsidiary of *Aluminium Limited*, has started construction of a new plant to produce 245,000 tons of alumina per year. First production is expected by mid-1958. The $35,000,000 plant, the second to be built in Jamaica, will be erected near Ewarton, about 50 miles from the company's initial plant. The latter is now being expanded to an annual capacity of 550,000 tons of alumina by the summer of 1957. The planned 800,000-ton capacity of the Jamaican operation is designed principally to support the primary aluminum capacity of 330,000 tons annually planned for the company's operations at Kitimat, British Columbia.

BRITISH GUIANA—*British Guiana Consolidated Goldfields Ltd.* is making slow progress with the erection of a hydroelectric power station at Tumatumari where the company's main camp is located. Unexpected and repeated flooding of the Potaro River has been the obstacle. It is now estimated that the project cannot be completed before the end of the year; therefore, the dredge being constructed on the Konawaruk River can not be completed and put into operation before the end of 1956.

PERU—*Banco Minero del Peru* plans the construction of a 50,000-ton lead smelter and possible sites are now under consideration. A German technician, Werner Schwars, had been hired to take charge of the project. Production from the small- and medium-sized mines is expected to increase when the new smelter goes into operation because the small producers will profit by better prices in exporting the metal instead of concentrate.

MEXICO—*Compania Minera y Beneficiardora de Copala, S.A.* plans to increase capacity of its 50-ton mill to 150 tons after developing various levels of the mine. The company will also install equipment for treating gold-silver-silicious ore that cannot be run through the flotation circuit. The silicious ores average 10 grams gold and 250 grams silver.

BRAZIL—A new copper ore discovery has been made at Martins in Rio Grande do Norte state. The copper is found in the form of chalcosite (Cu_2S) and bornite (Cu_5FeS_4) which are scattered in quartz veins. Some malachite and azurite exist in the main ore vein. The quartz veins are enclosed in mica schists and are supposed to have been formed during the intrusion of Archean granitic rocks. The new mine has been studied by the Brazilian Department of Mineral Production.

BRITISH GUIANA—*Central Guiana Exploration Company* has been finding diamonds in the Mazaruni River where

it is conducting exploration work. In the first 4.25 cubic yards completed, 29.57 carats were recovered. Large-scale equipment is now being moved in to undertake more serious work.

HONDURAS—*New Fortune Mines Ltd.* has acquired additional claims totaling 4,000 acres adjoining the *Batan* copper property already held by the company. Total claim area is now 6,000 acres, on which three copper finds are said to have indicated mineralized zones. The new discovery is called *Santa Inez*, and is four miles northeast of the Batan which is currently being drilled. Midway between these two, a third copper showing called the *Zopilote* has been uncovered. All three copper outcrops are linked by a bulldozed road, and development work is proceeding as rapidly as possible.

BOLIVIA—The Bolivian government has requested technical assistance from 15 Japanese mining experts in the development of mineral resources. The request was made following the visit of a Japanese mining survey team to Central and South American countries where the group inspected tin, antimony, lead, and zinc mines. The Japanese Foreign Office is making inquiries regarding Bolivian working conditions.

BRAZIL—*Tungsteno do Brasil S.A.* (*TUBRASA*), organized by European and Brazilian capital, is planning to build a plant to treat scheelite found in the northern part of the country. The company has already acquired some scheelite deposits and is surveying several areas in the mineralized region. This new plant will be the first in Brazil to produce tungsten from scheelite. *General Electric Company* is producing tungsten from wolframite deposits in Inhandjara, state of Sao Paulo.

PERU—*Cerro de Pasco Corporation* is enlarging its electrolytic zinc plant from the present 35 tons per day to 90 tons per day. Completion of this project is expected by the latter part of this year.

EIRE—*Can-Erin Mines* plans considerable extension of its exploration activities. Five drilling rigs have started operations on the *Bearhaven* group which consists of three mines in County Cork. Three drilling units will be used on the surface and two underground in order to obtain more detailed information about these mines which produced high-grade copper ore during the 19th century. Preliminary sampling returns show good copper values so preparations are being made to dewater the shaft and lower workings of the *Mountain* mine, one of the Bearhaven group. Work on the company's other two properties is of a similar nature; two drills are being used on the *Beauparc* copper mine, 30 miles north of Dublin, and one drill is being used at the *Lemgase* lead-zinc mine in the Castleblayney area. Shafts at both of these mines are being dewatered.

ITALY—About 10,000 76-pound flasks of quicksilver have been sold to the United States by Italian producers at a price which is equivalent to $255 a flask in New York. There are reports that one of the big Italian quicksilver producers is sold out until October. U.S. production of quicksilver totaled 18,830 flasks in 1955; imports from all sources totaled 19,435 flasks

YUGOSLAVIA—Trial operations are underway at the new Zorka zinc smelter at Sabac, Serbia which is the latest addition to the facilities at Cilli. The plant will have an initial annual rate of 6,000 tons of electrolytic zinc, 18 tons of cadmium, and 12,500 tons of sulphuric acid. Later, the capacity will be increased to 20,000 tons zinc, 60 tons of cadmium, and 40,000 tons of sulphuric acid.

ENGLAND—A sum of £100,000 has been made available by *Consolidated Tin Smelters* and *Tehidy Minerals* for capital expenditure in order to increase the output of the mine and modernize the treatment plant. Considerable progress has now been made in some of the new construction in connection with the alteration of the treatment plant.

EAST GERMANY—Progress is being made in the construction of East Germany's first zinc smelter at Freiberg, Chemnitz. The plant will treat local ores.

UNITED KINGDOM—The *Geological Survey of Great Britain* conducted an airborne magnetometer survey of East Anglia and South East England recently. *Hunting Geophysics Ltd.* had the contract for the work. A Hunting-Percival Prince twin-engine plane surveyed the 12,200-square-mile area.

AUSTRIA—Increasing demand for molybdenum and tungsten (sinter) prod-

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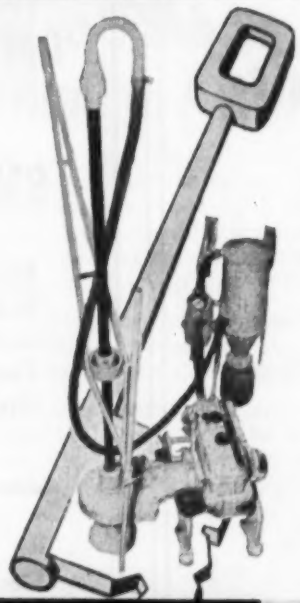

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ucts has increased production of *Metallwerke Plansee* at Reutte, province of Tyrol. Zirconium, free of hafnium, is being produced for atomic reactors, and recently production of tantalum and titanium were undertaken. With the aid of United States funds granted under the Moody amendments, a new research laboratory and pilot plant will be installed shortly.

EAST GERMANY—A pilot plant in the Hohenstein/Erstthal area is producing nickel. Under the Five-Year Plan, by 1960 the plant should be employing 1,000 workers.

BURMA—Production of tin and wolframite has been resumed at the *Mawchi Mines Ltd.* property. Output for the first quarter of 1956 was 40.35 tons of mixed tin-wolframite concentrate. This result is tiny when compared with the pre-war rate of nearly 6,000 tons per annum but present operations have been handicapped by difficulties inherent in reopening a large treatment plant after 6½ years and with an inexperienced labor force. These difficulties are expected to be only temporary, however, and a substantially higher rate of production is forecast for the remainder of the year. Meanwhile, there seems to be little likelihood of an early tie-up with the Burma Government, although negotiations are reported to be proceeding in an atmosphere of good will.

THAILAND—The managing director of the *Mines Organization* reports that the government-operated mine at *Pilok*, Kanjanaburi, yielded a total output of 156 tons of wolframite in 1955. Increased production is expected this year because technicians and modern machinery are being sent into this almost inaccessible mining district. Production during the first three months of 1956 was as follows: January 23 tons; February 21 tons; March 27 tons.

JAPAN—*Nihon Mining Company*, largest copper producer in Japan, is undertaking a ten-year exploration and development program in the Okutone area. The program will be carried out in three phases, the first phase running from June 1956 to 1958; the second, 1959 to 1962; the third, 1963 to 1967. Completion of the first part is expected to make possible the mining of 6,000 tons of ore per month; the second phase will bring this figure to 12,000 tons monthly; and the third 20,000 tons. The program includes road construction; erection of the Yagisawa Dam to increase hydro-electric power; sinking of three 5,800-meter shafts; cutting of 10 crosscut levels extending 3,000 meters in total length. In conjunction with the third expansion phase a 30,000-ton-per-month mill will be built at the mine site. Concentrate will be sent to the Hitachi refinery of the company. It is estimated that 6,000,000 metric tons of copper ore (Cu 3 to 7 percent); 4,000,000 tons of pyrite (S 40 percent); and 1,000,000 tons of lead-zinc-molybdenum are in reserve.

TURKEY—The *International Cooperation Administration* has authorized an allocation of $401,000 to Turkey for pur-

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chase of equipment for the *Murgul* copper mine managed by the *Eti Bank*. The money will be used to build and equip an aerial tramway ($375,000) and to buy mine cars ($31,000). Final delivery date is June 30, 1958.

THAILAND—The new grab dredge for *Aokam Tin Ltd.* is being completed for work on a large property off the island of Bhuket. Three 950-hp. Mirlees Diesel engines have been installed on the converted 5,000-ton oil tanker. The company holds mining leases totaling over 7,500 acres with an average value over 0.6 pound of cassiterite per cubic yard as reported by the government who is a major shareholder in the firm.

JAPAN—The flash smelting operations at *Furukawa Mining Company's Ashio* mine which recently went into operation (see MINING WORLD, June 1956, page 90) are reportedly not working at full rated capacity of 900 to 1,000 metric tons of blister copper per month because of some operational trouble in the fine ore feeding device. Output for April and May was 311 tons and approximately 400 tons, respectively. Cause of the unsatisfactory operation is said to be in the feeding device of fire ore, but there is no major defect in the whole system itself. Ashio produced 9,294 tons of blister copper in 1954 and 8,470 tons in 1955. It is trying hard to improve the present situation so that it can catch up on the scheduled regular operation of the new system.

PAKISTAN—*Pakistan Industrial Development Corporation* has started work on development of its mines at Kalabagh in the Mianwali district for large-scale production of iron ore. These mines will supply the new steel plant to be built at Piran-e-Ghaib near Mul'an. The three mines are the *Alexandria*, the *Barbara*, and the *Kutch*. PIDC engineers are working with technical men from *Krupps* (Germany) in developing the international transportation system, storage and loading bunkers, and mine workers' town sites. The laboratory set up by Krupps at Kalabagh analyzed about 150 samples of iron ore and reported an average iron content of 33.3 percent for the Alexandria, and 32.7 percent for the Barbara mine.

BURMA—It is reported that Russia will build a steel plant for Burma.

MALAYA—Mineralogists have completed a survey for the *Malayan Tin Dredging Company* off the coast of Selangor. The prospecting team worked over an area stretching from Negri Sembilan to Port Swettenham, test boring the ocean floor to a depth of 200 feet. The rock samples were found to contain very few traces of tin, indicating that mining operations would not be economical.

INDIA—Some preliminary investigations by the Geological Survey of India in Sikkim State have revealed the presence of several important minerals—among them, limestone, graphite, gypsum, kyanite, iron, pyrite, and garnet. These discoveries have prompted the Central government to send a group of geologists and mining experts to undertake a detailed investigation of the area.

BURMA—The Ministry of Mines has announced the discovery of a rich vein of iron ore near the village of Pin-nyo, not far from Taung-gyi (Shan States). Foreign experts employed by the Ministry predict a yield of 20,000,000 tons.

ONTARIO—*Algoma Steel Corporation* is expanding the operations of its *Algoma Ore Properties* subsidiary. Development work has started on the *St. James Mine* on Siderite Hill, three miles from the company's operating *Helen*, *Victoria*, and *Alexander* mines, and it is expected to be producing by 1957. This new mine's total resources are estimated at 80,000,000 tons. After a six-year period during which the mine is expected to produce 7,000,000 tons by open pitting, the mine will then become an underground operation. Algoma is also installing a sixth sintering machine at its sintering plant which will increase output by 350,000 tons annually, bringing it to 1,770,000 tons.

MANITOBA—Drilling results continue to be encouraging at the *Snow Lake* property of *Hudson Bay Mining & Smelting Company Ltd.* Authorization has been granted for construction of an eight-mile road from the existing highway to the properties, a 4⅝-mile power line to the properties, and sinking of a shaft.

BRITISH COLUMBIA—*Aluminum Company of Canada* has placed two additional potlines in operation which, together, will increase over-all company output by another 52,000 tons. Line No. 4 at Kitimat adds 30,000 tons. The other installation is at Isle Maligne in Quebec and adds 22,000 tons. At Kitimat, another line—No. 3—is scheduled for operation by the end of 1956. This one will add 82,000 tons.

LABRADOR—*Kennco Explorations Canada Ltd.* has joined *Frobishers Ltd.* as a partner in an exploration of the *Seal Lake* concessions this summer in Labrador. Kennco, a subsidiary of *Kennecott Copper Corporation*, examined the property last season. The concession area covers 500 square miles. Many copper showings have been found but none have been large enough for commercial development.

OREGON—*Harvey Machine Company* has contracted with Japanese companies for the delivery of alumina to supply Harvey's planned alumina plant at The Dalles, Oregon. To be delivered are 105,000 tons of alumina annually for a period of five years, with deliveries to start August 31, 1957.

SASKATCHEWAN—*Anglo Barrington Mines Ltd.* is reported to have discovered uranium on its 89-claim group while conducting limited diamond drilling this season. The company's claims are in the Higginson Lake area 140 miles east of Uranium City.

BRITISH COLUMBIA—*Surety Oils of Toronto* has started construction of a 1,000-ton copper mill at the old *Motherlode* copper property near Greenwood. The firm began test drilling the property last September.

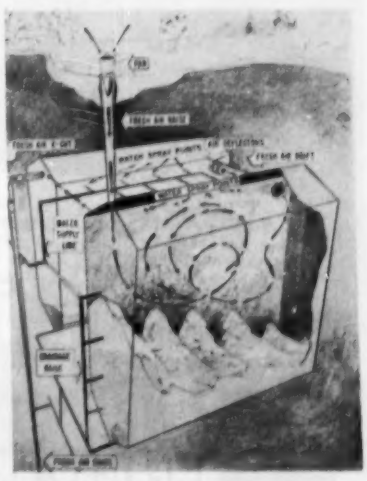
NEW YORK—Domestic bauxite production, as well as the amount of imports, rose during the first quarter of 1956 to provide the United States with well over 1,930,000 tons. Total imports amounted to 1,440,800 tons, an increase of two percent over the last quarter of 1955. Domestic ore production increased 13 percent over the final quarter of last year.

QUEBEC—*Rainville Mines Ltd.* in the Val d'Or district placed its new 400-ton concentrator in operation in April. Underground exploration is currently proceeding, along with regular mining, to substantially increase the proven ore reserves. Hoisting facilities are being improved and a new shaft will be sunk on No. 2 Zone West from which more extensive exploration can be conducted.

ONTARIO—The *M. A. Hanna Company* of Cleveland, Ohio is reported to be studying the possibility of bringing the *Moose Mountain* iron deposit at Sellwood, into production. The deposit is

Unique Air Conditioning System at INCO Mine

A unique air conditioning system that raises the temperature of cold air in the winter by making ice and uses the ice to reduce the temperature in the summer has been put into service at the Stobie section of the International Nickel Company's Frood-Stobie mine in the Sudbury District of Ontario, Canada. Instead of stoking the furnace or turning on the oil burner when the thermometer dives below zero during northern Ontario's frigid winters, ice production is stepped up to take the chill off the fresh air supplied from the surface to the mine workings. Basis of this unusual system is a convenient twist of nature whereby heat is released when ice is formed. The diagram above shows how the new air conditioning system works. The surface fans supplies fresh air which is circulated through the great cavernous stopes on its way to the main intake. In cold weather, water is sprayed at the top of the stopes to make ice, and the latent heat of freezing is transferred to the air. In summer, the warm air from surface is cooled as it passes over the ice. Water from the melting ice is drained to the mine pumping system through a raise connected to the stopes at 25-foot vertical intervals. The stopes, 80 feet wide, 200 feet long, and 200 feet high, are connected by a fresh air drift in the 70-foot pillar which separates them.



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about 40 miles north of the Sudbury copper-nickel district, and is estimated to contain a 20-year supply of 35 percent iron ore at a rate of 500,000 tons annually. If Hanna decides to undertake the project, it is said that the low-grade ore would be combined with high-grade Labrador ore in the making of steel. Target date would probably be 1958.

BRITISH COLUMBIA—Expenditure of at least $50,000 within the next 18 months at the *French* mine in south-central British Columbia is planned by *Cariboo Gold Quartz Mining Company* under a purchase agreement with *Kelowaa Mines Hedley*. A new low level is scheduled to be established.

ALASKA—*Union Carbide Nuclear Company* has a diamond drill crew seeking copper on Gravina Island. The company reportedly is planning to open offices in Juneau and Ketchikan, and is said to have optioned uranium claims on Bakan Mountain which tested at 7.0 percent U_3O_8. On Duke Island and at Union Bay, the *United States Steel Corporation* has staked many iron claims.

YUKON TERRITORY—*Yukon Consolidated Gold Corporation Ltd.* opened the season with Dredges No. 4, 8, 9, 10, and 11 in operation. The company expects that they will be in operation all season, along with No. 6 and 12, provided sufficient labor is available.

ILLINOIS—*Calumet & Hecla Inc.* has established a wholly owned subsidiary in Canada called *Calumet & Hecla of Canada Ltd.* It will be located in London, Ontario, and will represent an investment of more than $7,250,000. A new seamless, non-ferrous tube mill will be constructed which will make tubular copper products for the Canadian market, as well as for export.

ONTARIO—*Nickel Rim Mines Ltd.* is deepening its main production shaft at its property in the Sudbury district to 1,500 feet. The deepest level will be established at 1,291 feet, while crushing and loading stations will be provided below this. A mill building and additional equipment sufficient to double present capacity have been purchased and are being moved to a site adjacent to the present mill. The company's contract with *Falconbridge Nickel Mines* ends in September 1957, but it is expected that it will be fulfilled early in 1957.

MANITOBA—*Montgary Explorations Ltd.* is making plans for sinking of a large production shaft at its 12-claim lithium property on the north shore of Bernic Lake. Eventual erection of a 1,000-ton mill is also planned.

ONTARIO—A Hibbing, Minnesota mining firm is conducting exploratory work near Atikokan, looking forward to the possible start of actual mining operations in 1957. The exploratory drilling is being done by *Canadian Charleson, Ltd.*, which is associated with *Charleson Iron Mining Company*, also of Hibbing. The ore body consists of iron ore mixed with gravel, according to John Maki, engineer in charge of the exploration work. The firm plans to use the "Remer Jig" method of beneficiation for the ore. The system was developed by C. H. Remer, who is president of the new firm. If exploration proves satisfactory, the full-scale operations of the company would employ from 100 to 150 men. The company has approximately 1,000 acres of land under lease.

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AFRICA

UNION OF SOUTH AFRICA—*De Beers Consolidated Mines Ltd.* is negotiating for the purchase of the *Bellsbank* estate comprising more than 100,000 acres. DeBeers will rent the farm as a going concern and mining will continue. Between December 1954 and February 1956, the Bellsbank diggings produced 37,896 carats of diamonds valued at £545,250. This compares with the nearby *Nooitgedacht* diggings which produced 60,756 carats valued at £652,382 in seven years. The Bellsbank diamonds are mainly found in fissures which entail costly machinery and blasting. There are the usual water difficulties as the shortage in these regions is chronic, caused by soil erosion, and this makes operating costs comparatively high.

FEDERATION OF RHODESIA & NYASALAND—*Anglo-Transvaal Consolidated Investment Ltd.* will form a new company as a result of negotiations which have been completed with *Magundi Copper Mines & Minerals Ltd.* and *North Charterland Exploration Company (1937) Ltd.* for the purpose of acquiring sole prospecting and mining rights in the North Charterland concession area. Magundi has already conducted a survey of the area and reported encouraging results.

MOROCCO—The lead and zinc mines at *Touissit* and *Bou Beker* are almost at a standstill because of clashes on the Algerian border. Workers now refuse to work unless adequate security measures are taken to protect them. The smelter is operating on stockpile but this has almost been depleted. Between them, the two mines normally produce about 90 percent of Morocco's lead and zinc ores. Output last year was 122,000 tons of lead and 78,000 tons of zinc, plus 683 pounds of silver. Touissit is operated by the *Compagnie Royale Asturienne des Mines* and Bou Beker is operated by the *Societe des Mines de Zellidja*. Both firms process their ore at the Oued el Heimer smelter near Oujda run by the Zellidja-Penarroya group.

UNION OF SOUTH AFRICA—*Loraine Gold Mines Ltd.* has now been declared a uranium producer and will participate in the combined project of *President Brand, President Steyn, Freddies Consolidated, Western Holdings, Free State Geduld,* and *Welkom* mining companies. The last three have already been declared uranium mines, but are not yet uranium producing; they may enter the production stage next year, if not earlier. All the slime residues from the mines mentioned are being or will be treated in the uranium plants on the Welkom and President Steyn mines. These plants are being extended, with the additions to be completed by about mid-1957. Initial treatment of slimes from the Loraine mine should be underway by the year-end.

BECHUANALAND—Exploitable deposits of gold and silver ore have been discovered recently. Diamonds were recently located at Kau, and now another diamond deposit has been found near Mokhotlong, about 30 miles southeast of Kau.

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INTERNATIONAL

UNION OF SOUTH AFRICA—*Stilfontein Gold Mining Company Ltd.* has purchased the surface and mineral rights over an adjoining 554 claims, in which the occurrence of Ventersdorp Contact and Vaal Reef has been indicated. Stilfontein has converted its uranium plant from a double-stage to a single-stage leaching unit and this, with other improvements, has improved recovery to a degree more than compensating for the higher treatment costs. The gold yield and grade have continued to advance slightly. Design capacity of the reduction plant has been raised to 115,000 tons monthly, and in May 89,000 tons were milled.

GOLD COAST—Since *Konongo Gold Mines Ltd.* has taken over the neighboring *Lyndhurst Deep-Level (Gold & Silver) Ltd.*, it has been handling a greater tonnage. There has also been a considerable improvement in grade, which in May averaged 18.9 dwt. compared with 17.5 dwt. in April. Although three months of the current financial year were affected by the strike of African mineworkers on the Gold Coast, 1956 output and profit prospects were good. Since the resumption of operations, working profits have risen steadily from £15,700 in March to £16,700 in April and £22,300 in May.

MOROCCO—The Algerian-Moroccan border behind Beni Abbes and Tindouf is strongly disputed by Moroccan politicos who claim that this dotted line across the desert map should be advanced into Algeria for several hundred miles in certain places. This would give Morocco the greater part of the Sahara Desert's known mineral resources. Geological surveys have shown the pfesence of considerable iron ore, manganese, and lead deposits in an almost continuous line 60 miles long and 11 miles wide, extending southeast from the Foreign Legion headquarters at Beni Abbes.

GOLD COAST—The outlook for the future of *Bibiani (1927) Ltd.'s* mine is uncertain, except for the South orebody, because no new deposit has yet been located below the No. 12 level. In order to maintain the present rate of production, it would be necessary to develop at least two levels per year and an immediate program, therefore, has been undertaken to open up No. 20 and 21 levels on the South orebody. In addition, it is intended to drive north on the 24th level, and to start diamond drilling from the No. 18 level in order to expose a fissure zone down to the No. 21 level on the north side of the mine. Arrangements have also been made for carrying out intensive prospecting on the surface, north of the present underground workings.

MOROCCO—The possibility of extracting uranium from phosphate rock or phosphorite deposits in Morocco is being studied by the *Office Cherifien des Phosphates*, the state monopoly which operates phosphate mines at Khouribga and Louis Gentil. About 5,000,000 tons of phosphate are exported by this group every year. The OCP's attention was drawn to the practical possibility of extracting uranium by the fact that commercial production of uranium from phosphates has already begun in the United States as a by-product in processing of phosphate rock for fertilizer.

Southwest Potash

Continued from page 61 (WM45)

dumper without uncoupling the string. Total time required for dumping is about one minute per car or 10 minutes per train. The muck from each car drops to a hopper feeding a Jeffrey, single roll crusher which reduces the ore to minus 5 inches. The crushed ore drops by gravity to a steel bin with a holding capacity of 650 tons and which is part of a Link Belt designed and installed, automatic skip loading system.

As each skip is positioned near the bottom it encounters a stirrup in the shaft which trips a counter-balanced chute below the bin and lowers it to a loading position. The chute lip extends down into the skip and this allows muck from the 650-ton bin to flow by gravity into the skip. As the skip is filled, the muck in the loaded skip blocks further flow of material from the bin. When the skip is hoisted, the top encounters the counter-balanced chute lip which provide the force necessary to return the lip to its normal vertical position. The entire system is operated by timing the hoist to allow the skip to remain on the bottom under the loading chute for 47 seconds. Skips are hoisted at 1,000 feet per minute. Capacity of the system with the two skips is 28 skip loads per hour.

An Appreciation

William Addison Freeman

The recent death of William Addison Freeman, 82, removes a very remarkable man from the Australian business world. Mr. Freeman began his business career in 1900 as a solicitor after completing his law studies. He soon became an authority on company law, but legal practice did not hold him long before he became interested in mining.

Mr. Freeman took part in the forming of Malaysia Syndicate to secure properties for tin mining in Malaya. In 1912 a public company, Austral Malay Tin Limited, was formed of which he and the late H. E. Pratten were the first directors. Austral Malay Tin Limited and the subsidiary companies which it promoted proved highly successful and he was for many years chairman of directors of all these companies.

In 1928 he became associated with Placer Development Limited in the formation of Bulolo Gold Dredging Limited in New Guinea, and it was largely due to his vision and energy that this company was formed and guided to sensational success. Mr. Freeman was for many years president of Placer Development Ltd. and chairman of Bulolo Gold Dredging Ltd. He was also the moving spirit in the formation of other companies, notably Jantzen (Australia) Ltd., Oil Search Ltd., and Ready Mixed Concrete Ltd.

H. L. Brown
Acting Secretary
Austral Malay Tin Ltd.

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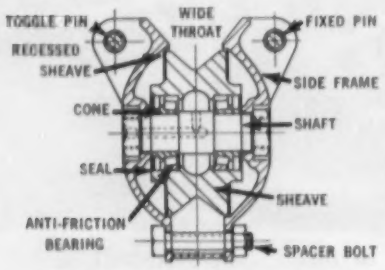

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Anaconda

Continued from page 57 (WM41)

These blasting improvements have been supervised by H. R. Burch who recently has been promoted from mine superintendent to assistant general manager.

Many small, but equally significant, cost savings are being achieved at W. H. today.

The operation is much as when it was completely described in the special Yerington issue of MINING WORLD in July 1954. However, the following changes have lowered costs, increased recovery, and resulted in higher output per man shift.

In the pit the Joy Heavyweight Champion blast hole drills now have a water injection nozzle which adds just enough water to the cuttings to prevent dusting. The cuttings are still blown from the hole by air, of course. Diamond drilling has found more ore, particularly on the western edge of the pit where the ore body dips under the ever increasing thickness of outwash alluvium overburden. Stripping is now underway to uncover this ore. The waste is being hauled southwest to the main waste dump. The big pit is also being extended toward the east with stripping of the second bench just getting started. The stripping is near the outcrop where the ore body was first found. It is a badly leached area and the waste is trucked northeast to waste dumps.

The new 1½-cubic yard P and H Diesel shovel is now in operation on the bottom bench. The shovel is used for loading about 1,000 tons per day of high-grade ore for blending. The big five-yard electric shovels are used for loading about 14,000 tons per day of low-grade ore. Shovel factor for these big shovels is still well over 7,000 tons per shift. The Dart trucks are still used for all haulage. Currently, experiments are underway, with the cooperation of the Cummins Engine Company, to try the new turbo-chargers on five trucks. Initial results appear promising and there undoubtedly will be a reduction in noise level and increased horsepower with the turbos.

At the Leviathan sulphur mine Isbell Construction Company has completed the primary stripping contract. However, the very wet winter and the most unusual nature of the overburden has resulted in several slides. These slides are now being cleaned out of the pit area by Anaconda. So unusual is this exploded-rock overburden that it will flow and act almost as a semi-plastic, finally coming to an angle of repose on slopes as flat as 15 degrees.

The crushing plant has worked perfectly and the agglomeration of the fines to the coarser particles has proved entirely successful. This step was fully explained in the special Yerington issue of MINING WORLD, July 1954.

In the Fluosolid roasters the fine dust generated from the sulphur ore still gives trouble. This is a physical property of the sulphur ore and Anaconda engineers have learned to live with it. By regular schedule of precipitator cleaning and Peabody scrubber cleaning no additional problems have been encountered. Therefore, cleaning is now a matter of routine operation.

For copper precipitation faster flow in the launders has meant better precipitation. Better washing has increased grade of copper precipitate. Today two-trommel washing is used with the trommels in series rather than the parallel washing previously used.

Experiments are underway to cut the moisture content of the precipitate so as to effect a saving on freight costs. With the two-trommel series washing, copper precipitate assays between 89 and 90 percent copper. Experiments on auger-type spiral extruding machine are underway to reduce the moisture in the precipitate.

At the tailing disposal area, truck haulage is working out fine. Originally trouble was encountered operating the trucks on the tailing pile, but this was soon overcome as the tailing area was enlarged so that the trucks could dump in an area which had been dried and stabilized for several days to insure enough firmness to operate on.

Higher copper prices have enabled W. H. to leach all material, assaying over 0.4 percent copper. Lower grade material is now continuing to be stockpiled for future possible treatment. Initially there were two grades of future leaching material: one below 0.4 percent, and a second between 0.4 and 0.6 percent. Proper blending of high grade from the bottom bench of the pit with the lower grades from other sections permits maintaining of a head between 0.8 and 0.9 percent copper. This assures maximum acid utilization and enables W. H. to meet its monthly quota of copper for Anaconda's smelter in Montana.

A model operation from the start, Weed Heights can best be characterized today by the expression "Little things mean a lot." Close attention to details, close control of costs, the willingness to try new equipment, well scheduled and well planned operations mean more copper recovery from the W. H. ore body at lower cost per pound.

U.S.A. Metal & Mineral Prices

METALS

		July 16, 1956
COPPER:	**Electrolytic.** Delivered F.o.b. cars, Valley basis	40.00¢
	Lake. Delivered, destinations, U.S.A.	38.00¢
	Foreign Copper, Valley basis	40.00¢
LEAD:	**Common Grade.** New York	16.00¢
ZINC:	**Tri-State Concentrates,** jig, flotation 80% lead, per ton	$201.32
	Prime Western: F.o.b. E. St. Louis	13.50¢
	Prime Western; Delivered, New York	14.00¢
	Tri-State Concentrate, 60% zinc, per ton	$84.00
ALUMINUM:	**Primary 30 Pound Ingots (99% plus).** F.o.b. shipping points	25.90¢
ANTIMONY:	**Lone Star Brand.** F.o.b. Laredo, in bulk	33.50¢
BISMUTH:	(In ton lots) price per pound	$2.25
CADMIUM	**Sticks and bars, 1 to 5 ton lots** (Price per pound)	$1.70
COBALT:	**97-99%, keg of 550 pounds** (Price per pound)	$2.60
COLUMBIUM:	**Powder** Nom., per pound	$119.25
LITHIUM:	98% (per pound)	$11.00-$14.00
MAGNESIUM:	**Ingots (99.8%)** F.o.b. Velasco, Texas, per pound	34.50¢
MERCURY:	**Flasks.** Small lots, New York	$257.00
NICKEL:	**"F" Ingots (5 pounds). F.o.b. refinery, Port Colbourne, Ontario**	64.50¢
SELENIUM:	**99.5%,** per pound	$13.50-$15.50
THORIUM:	**per kilogram:**	$43.00
TIN:	**Grade A. Brands.** New York (Price per pound) Prompt delivery	93.00¢
TITANIUM:	**99.3%** + Grade "A" Sponge (Price per pound)	$1.00
URANIUM	**Nominal, per kilogram**	$40.00
U-235:	**Nominal,** per kilogram	$11,000.00
GOLD:	**United States Treasury Price**	$35.00 per ounce
SILVER:	**Newly mined domestic.** United States Treasury price	90.125¢
	Foreign Handy Harman	90.5¢
PLATINUM:	**Per Ounce**	$103.00-$105.00
ZIRCONIUM:	**Sponge, Per Pound,** Nominal	$10.00

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Small lot purchases at Custer, S. D., Spruce Pine, N. C., and Franklin, N. H. Visual inspection at $400.00 per short ton or by assaying at: 8.0 to 8.9% BeO, $40 per unit; 9.0 to 9.9%, $45; over 10.0%, $50.

CHROME ORE: F.o.b. railroad cars eastern seaports. Long tons dry weight.

African (Rhodesian). 48% Cr_2O_3. 3 to 1 Ratio	$45.00-$46.00
African (Transvaal). 48% Cr_2O_3. No Ratio	$31.00-$32.00
Turkish, 48% Cr_2O_3. 3 to 1 chrome-iron ratio	$53.00

U. S. Government ore purchase depot Grants Pass, Oregon, Base price, lump ore, $115.00; fines and concentrates $110.00 for 48% Cr_2O_3 and a 3 to 1 chromium-iron ratio. Premiums for higher grade ore and for a ratio up to 3.5 to 1. Penalties for grades down to 42% Cr_2O_3.

COLUMBIUM-TANTALUM ORE: At United States small lot beryl purchase depots. $3.40 per pound contained combined pentoxides in 50% ore. Includes 100% bonus. (Government stopped buying temporarily May 12)

IRON ORE: **Lake Superior. Per gross ton Lower Lake Ports**

Mesabi, Non Bessemer, 51.5% Fe.	$10.85
Mesabi, Bessemer, 51.5% Fe.	$11.00
Old Range Non Bessemer.	$11.10
Old Range Bessemer.	$11.25
Swedish, Atlantic Ports, 60 to 68% Fe. Contracts, Per Unit	22.00¢

MANGANESE ORE:

Metallurgical grade. 48 to 50% Mn. Long ton unit	$1.30
Metallurgical grade. 46 to 48% Mn. Long ton unit	$1.27
Metallurgical grade. 45 to 46% Mn. Long ton unit	$0.95
Chemical grade. 80% MnO_2. Per Ton	$70.00

Domestic U. S. Government ore purchasing depots: Butte, Montana; (black and pink ores) base price of $4.87 per long dry ton of 18% manganese ore, Phillipsburg, Montana; base price of $6.43 per long ton unit of 15% manganese ore. Small lot program f.o.b. railroad cars, minimum 40% Mn. Base price (48%) $2.30 per unit with premiums and penalties.

MOLYBDENUM CONCENTRATE: **90% MoS_2 F.o.b. Climax, Colorado.** Per pound of contained molybdenum, plus cost of containers $1.10

TUNGSTEN CONCENTRATE:

Domestic. 60% WO_3 Per short ton unit	Nominal
Foreign. 65% WO_3 Per short ton unit (Scheelite)	$34.00
Foreign. South American, Spanish, Portuguese	$33.00

URANIUM ORE: **Carnotite-Roscoelite.** F.o.b. purchase depot plus $0.06 per ton mile ($6.00 maximum), Grand Junction, Rifle, Durango, Naturita and Uravan, Colorado **Salt Lake City, Marysvale, Thompsons, Moab, White Canyon, Green River, and Monticello, Utah. Shiprock, and Grants, New Mexico, Edgemont, S. Dakota, Riverton, Wyoming, Tuba City, and Cutter, Arizona.** Base price for 0.10% ore is $1.50 per pound and up to $3.50 per pound of contained U_3O_8 plus $0.75 per pound for each pound in excess of 4 pounds per short dry ton and an extra allowance of $0.25 per pound for each in excess of 10 pounds. A $0.50 per pound development allowance paid on all ore purchases. Special lime schedule applies at Monticello, Moab and Grants. No lime penalty with no vanadium payment or lime penalty with vanadium payment.

VANADIUM ORE: **Carnotite-Roscoelite.** V_2O_5 in ratio of more than 10 parts to 1 part of U_3O_8 are generally acceptable at all AEC depots, but excess not paid for at Marysvale, Monticello, and Bluewater. Shiprock has no limit on V_2O_5 to U_3O_8 ratio and all contained V_2O_5 is paid for ..... Per Pound V_2O_5 $0.31

NON-METALLIC MINERALS

BENTONITE:	**Minus-200-mesh.** F.o.b. Wyoming points. Per ton in carload lots	$12.50
	Oil Well grade. Packed in 100 pound paper bags	$14.00
FLUORSPAR:	**Metallurgical grade. 70% effective CaF_2 content per short ton F.o.b.** Illinois-Kentucky mines	$32.00-$35.00
	Mexican. 70% f.o.b. border	$24.00-$24.50
	European, Atlantic Ports, 70%	$33.00-$34.00
	Acid Grade. 97% CaF_2 F.o.b. Kentucky, Illinois, Colorado	$47.50-$50.00
PERLITE:	**Crude:** F.o.b. mine per short ton	$3.00 to $5.00
	Plaster grades. Crushed and sized. F.o.b. plants	$7.00 to $9.00
SULPHUR:	Long ton, F.o.b. Hoskins Mound, Texas	$25.50
	Export	$30.50

LONDON METAL AND MINERAL PRICES

		July 16, 1956 Per Long Ton		USA Equivalent cents per pound[1]
COPPER:	**Electrolytic spot**	£287	0s 0d	35.87¢
LEAD:	**Refined 99%**	£114	10s 0d	14.31¢
ZINC:	**Virgin, 98%**	£93	15s 0d	11.72¢
ALUMINUM:	**Ingot, 99.5%**	£189	0s 0d	23.625¢
ANTIMONY:	**Regulus, 99.6%**	£222	10s 0d	27.81¢
TIN:	**Standard, 99.75%**	£741	0s 0d	92.63¢
TUNGSTEN:	**Long ton unit, 269 $**	$36.40 per long ton unit		

1. With Sterling pound at $2.80.

Quotations on metals and certain ores through the courtesy of *American Metal Market*, New York, N. Y.

McCARTHY
NEW HEAVY-DUTY VERTICAL AUGER DRILL

**Strip Miner Drills 8-1/2" Blast Holes 60 Ft. Deep in 1 Hour, Including Moving Time.*

Savings, like costs, are measured by the foot, especially in tough earth and rock formations. Using the new McCarthy 106-24 Vertical Drill, this Pennsylvania strip miner cut drilling time to 1 hr. per hole (including moving time) on 60-ft. blast holes 8½" in diameter. Formation was 20 ft. of soft top strata, 35 ft. sandstone and 5 ft. of hard sandstone and bastard limestone.

A new speed reducer on Model 106-24 slows auger rotation for drilling harder rock formations. The result is more torque, or "biting power." You have fewer bit failures, cutting over-all drilling time. Driller above used tungsten carbide bits.

The McCarthy Model 106-24—"World's Fastest Heavy-Duty Vertical Auger Drill"—handles augers from 3" to 24" in diameter.

Write for Bulletin M-100

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PRODUCTION EQUIPMENT PREVIEW

PEP is just what new equipment, increased mechanization, and new methods can give to your mine, mill or smelter. This PEP section is MINING WORLD's way of making available to you some of the finest current information on mechanization.

Stearns Timber Framer Saves Time and Money

The new Stearns-Roger Timber Framer enables mine operators to have their timber framed faster and more economically. The Stearns-Roger Timber Framer cuts true-to-line without regard to straightness or cross sectional shape of the timber. A complete tenon may be cut in two quick passes.

The framers are available in single or double end models, with direct electric drive, or can be equipped for belt drive. Machines come complete with carriages, turntables, trolleys etc., as layout requires. If you have costly timber framing problems, circle No. 75.

New Off-Highway Trucks Rated at 18 and 24 Tons

Two diesel powered off-highway trucks for mining have been produced by the International Harvester Company. The 24-ton Model 95 Payhauler is powered with a turbo-charged 335-hp. diesel and the 18 ton Model 65 has a 250-hp. diesel. The two new trucks have greater horsepower-to-payload weight ratio than is available in any other off-highway trucks according to the manufacturer.

They are reported to have stronger main frames for longer working life, reduced maintenance cost, higher speeds, full power hoists, and better visibility. Three main features were designed into these new trucks: Increased payload capacities to work with larger shovels, higher hauling speeds, and improved body design to handle a greater variety of materials. In addition easier control for greater operator comfort and efficiency, as well as new engineering for easier field maintenance have been included in the design. For further information circle No. 76.

Complete Scraper Line Of Wooldridge Exhibited

Featuring a display of what is believed to be the most complete capacity range as well as the largest scrapers built, Wooldridge Manufacturing Division, Continental Copper and Steel Industries, Inc., recently was host to a group of leading earthmoving equipment distributors from all parts of the U. S. and Canada.

Shown are self-propelled scraper and hauling unit models in 2-axle and 3-axle types from 7⅞ to 20 yards struck, up to the giant 41-yard heaped capacity Model OS-300, designed for use with the world's largest tractors; and specialized allied equipment were included in the display. For information regarding any models circle No. 74.

New Hydraulic Shovel Has Ball Bearing Turntable

Called the Yumbo, and developed in Italy several years ago, the unique power shovel features a precision-built ball bearing turntable, and heavy duty hydraulic system. The unit is manufactured in the U. S. by Geco, Inc.

The Yumbo, being an all purpose tool, has the following attachments available: ¾-yard backhoe, ¾-yard front dump bucket, ¾-yard rock bucket, ¾-yard gravel bucket, ¾-yard clamshell, and a 6500 pound crane hook. One man can change attachments in ten minutes without any hard labor. The backhoe has a digging depth of 10 feet, and a clear dumping height of 10 feet. The turntable consists of upper and lower races, integral gear and center race, and 168 ball bearings. Practically dust proof, periodic lubrication will force out any dust which might have worked into the turntable. Low friction and 360° continuous rotation, right or left are additional turntable features.

The unit may be mounted on any truck two-tons or larger. For further information circle No. 80.

Slurry Test Laboratory Figures Friction Losses

A new test lab for determining, in advance, critical carrying velocities and friction losses of tailings, and abrasive slurries, has been developed by Morris Machine Works, Baldwinsville, New York. Reportedly the only lab of its type in the country, it enables the firm to recommend pump and pipe sizes that will most efficiently handle particular slurries. For further information Circle No. 55.

NEW MINE LAMP: A new Edison Four-Cell Trip Lamp that provides greater visibility and dependability for all types of mining conditions has just been made available by Mine Safety Appliances Company, Pittsburgh. Approved by the Bureau of Mines, the new trip lamp is rectangular in shape and designed to be hung quickly by its forged steel hook on the side or back of any mine car. Circle No. 1 for further information.

POWER-TURN STEERING: The Oliver Corporation introduces Powe.-Turn Steering on the new Oliver OC-18 tractor. This is fully explained in a new 16-page illustrated bulletin. Combining the most desirable features of clutch and differential steering, Power-Turn enables the operator to make spot turns or gradual turns or to vary speed and pulling power instantly without declutching. Circle No. 2 for your copy of bulletin.

GEOPHYSICAL INSTRUMENTS: Sharpe Instruments Ltd. of Toronto, Canada, have released a new brochure on their line of highly portable Magnetometers, Self-Potential Survey Units, Dip Needles, and Electromagnetic Survey Units. Send for your copy of this informative brochure, circle No. 3.

NEW HYDRAULICALLY actuated tilting attachment for use with No. 9S and 8S Bulldozers has been announced by Caterpillar Tractor Co. The new attachment is designed to give D8 and D9 Tractors increased versatility on jobs requiring frequent tilting of the blade. Circle No. 4 for further information.

ELECTRICAL TAPE: A complete line of vinyl electrical tape, trade named "Porter" and manufactured by Quaker Rubber Division, H.K. Porter Company, is now available for distribution. The new tape is recommended in place of friction and rubber tape where abrasion exists or where tape is subjected to water, acids, alkalis, or corrosion. Makes a neat and efficient installation. Circle No. 5.

PLANT ENGINEERING, design and construction are featured in a new 28-page folder released by W.K.E. Division of Wester Machinery Company. The brochure describes in detail their operations and experience in engineering design and construction on mines, mills, and other facilities. The company indicates it is prepared to handle any phase from preliminary design to turn-key jobs of any size. Circle No. 6 for your copy of this interesting brochure.

QUALITY GEAR REDUCERS: David Brown Co. of Huttersfield, England, who have recently started to distribute their line of precision gear reducers in the United States have released a new catalog featuring their complete line of Radicon gear reducers. This 66 page brochure has much fine engineering data contained in it, along with complete descriptions of their reducers and couplings. For your copy of this excellent catalog circle No. 7.

THE GRAVITY ANOMALY Simulator, a new instrument that simulates the effect on the earth's gravity field of a subsurface body of anomalous density, is announced by Houston Technical Laboratories. This compact instrument will be of value in interpreting data obtained when prospecting for petroleum and minerals with gravity meters. For additional information circle No. 8.

UNDERGROUND DIESEL Loader developed by the Joost Manufacturing Company is an ideal machine for underground mucking in confined areas. This small crawler track loader may also be equipped with a bulldozer blade. The 7 bhp "Agricat", according to the company, can easily load a one-ton car in four to five minutes. Circle No. 9 for further information.

LABORATORY FLOTATION machines by the Booth Company of Salt Lake City are described in a new brochure recently released. The machines design integrity, that is the lab model aerating mechanism is a careful scale-down of Booth commercial machines. Results can be interpolated quite readily into actual plant requirements. Wearing parts fabricated with pressure molded rubber. Metal parts in contact with pulp are stainless steel. Circle No. 10.

MECHANICAL FEATURES of the complete line of new International Diesel crawler tractors are contained in a six-page folder now available. Described are the International TD-24, TD-18, TD-14, TD-9, and TD-6 models, along with photographs of the machines on the job and close-ups of outstanding features. Circle No. 11 for your copy.

CAR PULLER: The moving and spotting of freight cars on railroad sidings, and barges at dock sides, is now made simpler, easier, less costly, and safer through the use of an improved two-way, double-drum car puller developed by the Jones Machinery Division of Hewitt-Robbins, Inc. Circle No. 12 for further information.

METALLURGICAL EQUIPMENT: Western Machinery Company has recently released a condensed 4-page catalog of its complete line of equipment and services for mines, mills and process plants. This includes descriptions of the principal units with specifications as to sizes and capacities and describes in brief their laboratory testing services and engineering, design, and construction facilities available. Circle No. 13 for your copy.

NEW, OVERSIZE Back-Rippers for Caterpillar D9 tractors have been introduced by Preco, Inc. These Rippers are comprised of four housings with pivoted shanks capped with lock-on teeth. These housings are welded to the reverse side of the straight blade moldboard. The new Back-Rippers break out the hard ground when the tractor is normally deadheading on the back-up trip. For further information circle No. 14.

ALL RUBBER IMPELLERS are now available for your flotation machines from the Booth Company. These Booth agitation impellers are made from tough, resilient, gum rubber, or from neoprene. They offer excellent abrasion resistance and have an extremely long life under the worst conditions. Impellers are simply slipped onto the shaft and held in place by friction. Circle No. 15 for free descriptive brochure.

WELDING HANDBOOK: the Eutectic Welding Alloys Corporation have recently released a new 170-page welding data book. This pocket size edition contains a wealth of information on welding theory, application, and the various types of welding rod available by Eutectic. Much space is given to methods of low temperature welding as developed by the company. This is indeed a textbook on welding. Circle No. 16 for your free copy.

VERSATILITY of the International Drott Skid-Shovel is shown in a new eight-page, two-color mailing folder now available. Featured the Skid-Shovel's five chief advantages, listed as the "pry-over-shoe" breakout, skid-shoe action, description of its depth-gauge indicator

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for straight-forward loading, parallelogram raise action, and the shock-swallowing protection of its patented Hydro-Spring. Circle No. 17 for your copy.

CIRCULAR STEEL SETS: The Chapman-Dyer Steel Manufacturing Company, have recently developed a new type circular steel drift set. The set consists of three curved sections of 4-inch H beam with flanges, that form a ring 6½ feet in diameter when bolted together. These sets are now available from their Arizona Plant. Circle No. 18 for further information.

ELECTROSTATIC SEPARATION: The Bureau of Mines has issued tables of temperature ranges at which various minerals are most easily recovered by electrostatic separation. The tables are included in a report on electrostatic separation available to you by writing for copy of Report of Investigation 5215, "Effect of Temperature on the Electrostatic Separation of Minerals", Bureau of Mines, Publications-Distribution Section, 4800 Forbes Street, Pittsburgh 13, Pa. Identify by number and title.

WHEEL FLANGE LUBRICATOR: Extend the life of mine car and locomotive wheels with the new Transell, Inc. flange lubricator. The simply installed lubricator contains a replacable lubricating stick. Flange lubrication in this manner reduces to a minimum hot spots, cutting and pitting of flanges, and also prolongs the life of the rails, switches, frogs and crossovers. Send for free bulletin, Circle No. 25.

KEEP UP-TO-DATE on latest developments in powder manufacture and blasting equipment. This is possible by subscribing to the Atlas Powder Company's informative Newsletter. Start receiving your copies by circling No. 28.

INCREASE FOOTAGE OF diamond core drills with Stoody Acetylene Tube Borium. Core barrels, flutes, and reamers, coated with this hard facing compound greatly extend the life of these items, thus lowering the overall drilling costs. These facts and many more are elaborated on in Stoody's new hard-facing guidebook. Send for your copy, circle No. 29.

MANY FEATURES are incorporated in the new Joy Tungsten Carbide Rock Bit. Two grades of carbide inserts are available, one for medium ground, and one for hard ground. For the full story write for a copy of the Joy Bulletin 70-8, or circle No. 30.

MOTO-CRANE CATALOG: The Thew Shovel Company has jut published a two-color catalog describing two new 25-ton Lorain Moto-Cranes, Models MC-425 and MC-425W. The MC-425 is 96 inches wide, the alternate Model MC-425W, is 108 inches wide to permit developing greater lifting capacities without the use of outriggers. Circle No. 31 for your copy.

TEETH REPOINTERS: The Industrial Overlay Metals Inc. of Eaton, Ohio now have literature available on their line of bucket teeth repointers. The special manganese cast points are welded on to the worn teeth, thus saving welding rod and loss of valuable tooth metal by having to cut back to fit point. Also available is a new nickel-manganese welding electrode with a powdered metal coating, enabling higher amperage to be used for rapid deposition. Circle No. 32 for your copies.

POCKET MICROSCOPE: Industrial Overlay Metals Inc. have available a new pocket microscope with a magnifying power of 20. According to the company the instrument comes ready to use, no adjustments are needed, and nothing to get out of order. For accurate inspection where high magnification is needed. Price $3.65 each. Circle No. 33 for further information.

FORCE DOWN Your Operating Costs is the title of a new brochure prepared for you by the Osmose Wood Preserving Company of America. The booklet tells of how you can greatly reduce your timber bill by using Osmose decay-resistant timbers, or Osmose chemicals to treat your own timbers to prevent rot and insect destruction. Circle No. 49 for your copy.

PORTABLE CRUSHING PLANTS: The Gruendler Crusher & Pulveriser Company has now available a new booklet describing their latest line of portable crushing plants. These plants are complete and can be installed with delivery conveyors, vibrating screens, and trommel screens. Circle No. 50 for your copy.

LOADING RODS: The Mahogany Importing Company has now available powder loading rods made from Bagac, a Philippine hardwood, which according to the company wears like iron. Field tests have shown the rods are exceptionally strong, do not warp or splinter, are long wearing and economical. Many sizes are available. Circle No. 51 for further information.

POWERMITE TWIN: This light little drill is available from the Powermite Drill & Tool Company. Weighing only 80 pounds this self-contained unit will drill even the hardest rock quite rapidly. The drill bit rotates on the end of a flexible shaft, and all cuttings are blown out of hole by small compressor which is integral part of drill. Circle No. 52

SWIVEL PRODUCTS: The General Machine and Welding Works of Pomona, California, have published a new catalog available to you on the Miller line of swivels, and swivel hooks. The swivels feature construction with ball bearings and they are able to rotate under heavy loads. According to the manufacturer they have a breaking strength 25 percent greater than that of the recommended size wire rope. Circle No. 53 for your catalog.

VALVE ACTUATORS: The Ledeen Company has available a new catalog on its complete line of Plug Valve Actuators. These actuators can operate valves pneumatically or hydraulically for power operation, remote controls, automatic processing, etc. Circle No. 54 for your copy.

DRILL ROD CARE: Stanco Sales and Manufacturing Company has now available a catalog on the use and care of their line of SKF carbide-tipped drill rod. This useful booklet describes proper regrinding of carbide tip, causes of drill and insert failure, and other useful information. Circle No. 56 for your copy.

MACHINERY CATALOG: Morse Brothers Machinery Company of Denver have recently published a new catalog listing their complete line of mining, milling, and construction equipment. Items described range anywhere from analytical balances to mine car wheels. Almost everything you may need, both new and reconditioned may be found. Circle No. 59 for your copy.

AUSTRALIAN PUMP now available in the United States from Carpco Manufacturing Inc. The Warman rubber-lined pump was developed in Australia and is widely used throughout the Far East. Designed for heavy continuous duty handling of abrasive slurries or corrosive liquids, the pump requires no sealing water. Sizes are available from 1 by ¾ inch to 8 by 10 inches. Circle No. 60 for additional information.

For Free Product Literature see other side

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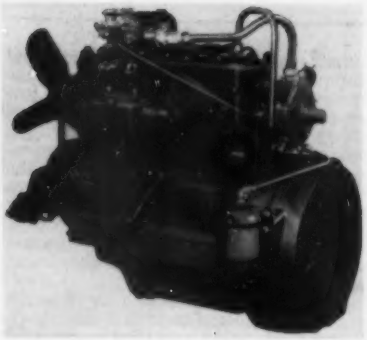


LPG, Natural Gas Can Now Be Used On Jeep Engines

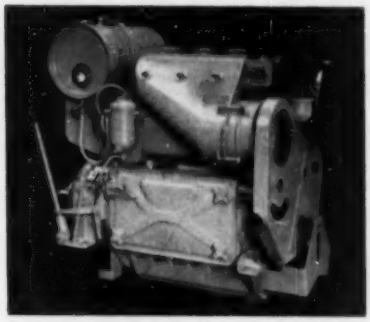
LPG and natural gas conversions of "Jeep" L-Head and F-Head industrial engines are now available as optional equipment. Willys officials maintain that the use of hard-faced stellite valve inserts, standard Willys water cooling of the manifold plus LPG carburetor and regulator equipment make the "Jeep" engine ideal for burning propane or natural gas.

The advantages of the LPG or natural gas conversions lie in their high octane at low cost. Since LPG is a by-product in the manufacture of gasoline, it is available in large quantities; yet, at present, only a small portion is put to commercial use.

Advantages of utilizing LPG for industrial engine power are said to include longer use of lubricating oil without danger of thinning; reduction of carbon deposits; longer engine life due to more efficient lubrication. Circle No. 73 for further information on this engine.

Little Rig For Surface Mineral Exploration

A new and improved miniature core drill, designed for surface exploration, has recently been placed on the market by Du-Jac Manufacturing Corporation. The portable gasoline powered drill, called Mini-Drill, drills a 1 1/16-inch hole, recovering a ⅝-inch core in a 5 or 10-foot long core barrel. Weighing approximately 400 pounds, the drill includes 100 feet of rod, and can easily be transported by men, mules, jeep, or plane. It features a constant feed drill head, adjustable rate of advance, simple set-up, and a hinged drill-head for quick retraction. The positive drive feed and automatic drill retraction operate from one clutch. Circle No. 69 for further information.



Air-Cooled Diesels Answer "Over Heating" Problems

Deutz Diesel engines, available in the U. S. through Diesel Energy Corp., N. Y., are designed for higher operating temperatures than liquid-cooled units. The higher temperature-compression levels mean greater fuel efficiency. Corrosion danger from the sulphur content of most Diesel fuels is also eliminated due to the hotter combustion conditions preventing condensation of sulphurous acid within the cylinder, according to the manufacturer.

An 8-page brochure describing the features and application of air-cooled Diesel engines for stationary service and for installation purposes is available from Diesel Energy Corp. The brochure also includes a detailed performance data chart. For your copy circle No. 79.

Submersible Sump Pump Pumps River Jordan

A recent demonstration held on the Jordon River near Salt Lake City, proved the capabilities of the new Flygt Sump Pump before many mining officials. The electrically operated Flygt pump operated completely submerged, pumping the mud laden river water. According to the Stanco Manufacturing and Sales Co., the Flygt Drainer can handle as much as 40 percent solids.

Two of the self-priming pumps were used in the demonstration. The lightweight, 70 pound model B-38L, with a pumping range of 25 gpm operating against a 60-foot head to 55 gpm against a 20-foot head, was used along with a model B-80. The 175 pound B-80 has a range from 110 gpm against a 90-foot head, to 275 gpm against a 20-foot head. For further information on these versatile pumps circle No. 72.

Notes From The Manufacturers

Shelly G. Hughes is the new president of Differential Steel Car Company at Findlay, Ohio. He replaces H. Fort Flowers, now chairman of the board. H. H. Houck was elected senior vice president and D. F. Flowers was chosen vice president of sales, metal mines department.

Robert H. Morse, III, former sales manager of Fairbanks, Morse & Company, is the newly elected vice president—sales. D. L. Harwood, formerly general purchasing agent, was chosen vice president—purchases, and J. F. Weiffenbach was moved up from the position of chief product engineer to director of engineering.

Jack G. Errion has been promoted from sales promotion manager to assistant to the domestic sales manager of LeTourneau-Westinghouse Company. Kenneth W. Chriswell will serve as assistant advertising manager of the firm. Previously, he was assistant sales promotion manager. **David R. Harvey,** who has been a member of the advertising staff more than nine years, has been appointed sales promotion supervisor.

Atlas Copco Aktiebolag of Stockholm has acquired controlling interest in Arpic Engineering S. A., Belgium. Atlas Copco is devoted exclusively to the manufacture of pneumatic equipment, including rock drills and stationary compressors; while Arpic is also a producer of portable air compressors for mining, construction, and other heavy industries.

Clyde Crozier has been chosen European territory manager, Tractor Group, Allis-Chalmers Manufacturing Company, Milwaukee, Wisconsin. He succeeds Myron W. Rhoten who recently became managing director of Allis-Chalmers Great Britain Limited, the wholly-owned Allis-Chalmers subsidiary in Essendine, England. John Feustel has been appointed Africa and Middle East territory manager, Tractor Group.

Norman M. McGrane has been promoted to the post of chief technical engineer and elected to the board of directors of Western Precipitation Corporation. Mr. McGrane has been with the company 31 years.

Carrol G. Turk has joined the Thew Shovel Company, Lorain, Ohio, manufacturer of "Lorain" power cranes and shovels. Mr. Turk will coordinate staff functions between the engineering and service departments.

Atlas Copco Pacific, Inc. of San Carlos, California has been appointed distributor for Deutz air-cooled Diesel engines. This was recently announced by R. D. Friedlander, general sales manager of Diesel Energy Corporation of New York City.

W. E. Galland has assumed management of the Solids Pump Division of Western Machinery Company, replacing G. Y. Murray. Mr. Murray has been transferred to take charge of sales activities for the Western District of Western Knapp Engineering, an engineering, design, and construction division Western Machinery.

American Gilsonite Develops Two Mining Machines and Builds Pipeline and Refinery

Details of the $16,000,000 project under which American Gilsonite Company will convert gilsonite mined at Bonanza, Utah into high purity electrolytic coke for the aluminum industry and high octane gasoline has been revealed by Ernest F. Goodner, president of the Salt Lake City firm.

The project involves a new processing plant to be completed in the spring of 1957 and the laying of one of the world's largest pipelines for transporting a solid material to link the mines in Utah with the new refinery near Grand Junction, Colorado.

The raw material, gilsonite, is a black solid hydrocarbon with a high resin content. It occurs in nearly vertical fissures that vary in depth from 100 feet to more than 1,500 feet. The fissures vary from a few inches up to 22 feet in width. Ore will be extracted from veins that are greater than six feet in width.

Two new "wet" mining methods have been developed by the company over the past four years. Both methods reduce the explosion hazard to practically zero and reduce the need for hand labor in the actual mining operations.

The first step in the new methods is to sink a deep shaft alongside the gilsonite vein. The vein must be at least six feet wide, and the shaft is initially sunk to over 850 feet in depth. Next, drifts are driven from both sides of the shaft into the gilsonite vein. These are cut by means of a jet cutting car, equipped with two different types of cutting heads, depending on the type of ore mined. Some type of gilsonite ore contains tiny cracks or fractures. In these veins, a powerful jet of water, issuing from a ¾-inch nozzle, with a pressure of 2,000 pounds per square inch, is played on the surface of the ore. The stream of water penetrates the tiny fissures, the ore breaks apart and falls to the bottom of the drift. The drifts are cut on a rising grade of approximately 2½°. The water that cut the ore, with the help of some low pressure water, washes it down the drift to the main shaft, down the shaft and across a dewatering screen where the few lumps of ore above ¾ inch in size are separated from the water. The large lumps of ore are hoisted to the surface in a ship. The water and minus-¾-inch Gilsonite ore are pumped to the surface with centrifugal pumps.

Another type of ore-cutting tool developed by the company consists of a long rotary drill armed with carbide-tipped teeth. The drill cuts a large swath through the ore and, meanwhile, streams of water pour out through the teeth, keeping the ore constantly wet throughout the entire operation. Again the ore is washed down the drift, to the main shaft for dewatering, and hoisted or pumped to the surface.

Both types of cutting tools are mounted on a new and unique chassis developed by the company. It moves on four rubber-tired wheels and is operated by air power. Mounted on it are two hydraulic booms similar to the drilling jumbos used in mining. These jumbos support and guide the cutting tools.

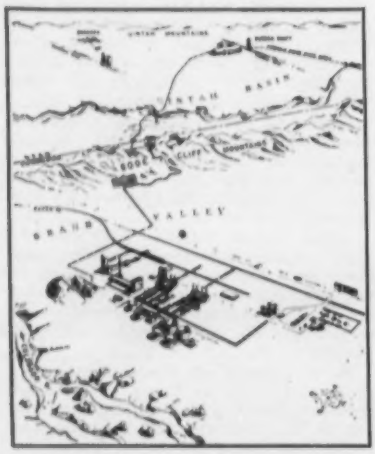
When a drift is completed, the cutting machine returns to the shaft, begins a new drift and repeats the entire operation. Every 50 feet of depth, a floor will be installed for overhead protection. The walls will be timbered almost solidly with timber. About every 350 feet of depth, a pillar of ore approximately 30 feet high will be left horizontally between the walls for major protection and strengthening.

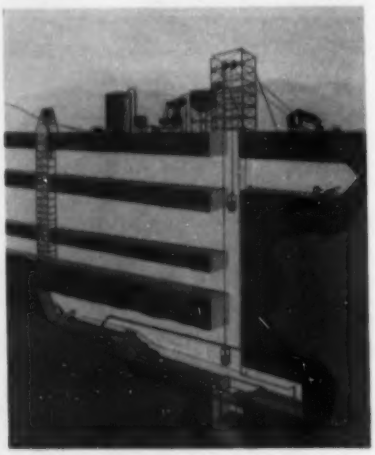
This type of mining eliminates the hazard of gilsonite dust. Transportation of the ore in water eliminates the possibility of dust becoming airborne in these large underground stopes. At present, the rotary drill method is employed in the Bonanza vein. The hydraulic jet method will be employed in the Cowboy, the largest gilsonite vein in the world. Eventually, both methods will be used in all the mines of the American Gilsonite Company.

At the surface, ore not destined for the refinery is crushed and introduced into water again and flows by gravity pipeline to a drying plant at Bonanza. At the drying plant, the plus-¼-inch material is removed by screening. The minus-¼-inch material is put through a centrifuge. The centrifuged gilsonite and the plus-¼-inch gilsonite from the screen are mixed and sent to a fluidized bed dryer, where hot air is blown through the gilsonite until it dries to less than 0.5 percent moisture. This is a continuous process drier. The product from the drier is again screened to the various sizes required for the trade. The effluent from the centrifuge is piped to flotation cells where the gilsonite and water are separated without the addition of reagents.

Ore destined for the refinery, when it reaches the surface, is dewatered, dumped into a bin, and then recombined in a tank with a portion of the water which carried it from the bottom of the mine. This slurry is prepared in the proper pumping proportion and then cleansed in a process that drops out the sand, rock, and other tramp material. Gilsonite is an exceptionally pure mineral and there is simply no foreign matter in the material itself. Sulfur content is very low and there are only traces of other minerals.

After cleaning, the material will be stored in 5,000 barrel tanks. The tanks will be agitated to keep the material suspended, and from these tanks the gilsonite slurry will be pumped through the pipeline to the refinery over 70 miles away.





Picture at left is a bird's-eye view of the over-all project showing mine, plant, and route to be followed by the connecting pipeline. Picture at right is a cross-section of a gilsonite vein showing how the new hydraulic mining methods will be applied. Vertical shaft is sunk and then slightly sloping drifts are cut at right angles to it.

AEC Expands Operations Of Grand Junction Office

The Grand Junction, Colorado Operations Office of the Atomic Energy Commission has been expanded to include all the Commission's uranium exploration activities west of the Mississippi River, in addition to continuing the ore and concentrate procurement programs in the same geographic area.

Under the new arrangement, the Grand Junction office will have direct control over AEC offices in Denver, Colorado and Salt Lake City, Utah. These offices were formerly operated as branches under the AEC's Division of Raw Materials in Washington, D.C.

In the past, the Grand Junction office was responsible for ore and concentrate procurement in the western United States, and for exploration only in the Colorado Plateau area. All exploration and procurement activities in states west of the Mississippi will now be under the assistant manager for operations, Elton A. Youngberg, who is past director of the mining division in Grand Junction. Walter B. Carlson, until now director of the finance division, will be assistant manager for administration. Both men report directly to the Grand Junction Manager of Operations, Allan E. Jones.

Wyoming Forms Its Own Mining Association

At its organizational meeting in Riverton, Wyoming, the newly formed Wyoming Mining Association elected R. Lauren Moran, attorney, as president of the group.

Other members of the board of directors are Glenn E. Sorensen, president of the Kemmerer Coal Company, of Kemmerer, Wyoming, who also has been elected vice president; Richard K. Lisco, president of the Teton Drilling & Exploration Company of Riverton, who was named secretary-treasurer; and Myron

Sisson, manager of the Sunrise iron mine for Colorado Fuel & Iron Corporation; N. E. McDougal, assistant resident manager of the trona mining operation near Green River, Wyoming for the Intermountain Chemical Company; and Roy Coulson, superintendent of the Gas Hills uranium mining operation for Vitro Minerals Corporation.

The new association will have headquarters at Riverton. The date of the annual meeting was set as the third Thursday in April. The board, however, will hold additional quarterly meetings at different places in Wyoming.

Huge Expansion Underway At Union Carbide Nuclear

A multi-million dollar expansion program is underway for Union Carbide Nuclear Company as the result of a new contract with the Atomic Energy Commission. The company, a division of Union Carbide and Carbon Corporation, is erecting a new uranium processing mill at Rifle, Colorado and two ore receiving stations and chemical up-grading plants on the Colorado Plateau; one at Slick Rock, San Miguel County, Colorado, and the other at Green River, Emery County, Utah.

Union Carbide Nuclear now has a processing mill in operation at Rifle, but lack of space and the tailing disposal problem led to the decision to build an entirely new and larger mill instead of expanding the old one. The new plant will be located two miles down the Colorado River from the present one and will be about three-fourths the size of the firm's huge Uravan, Colorado plant.

The two new ore receiving and upgrading stations will have facilities for receiving, crushing, sampling, and beneficiation of crude ore with processes developed by Union Carbide Nuclear Company. The concentrate then will be sent to the Rifle mill for processing.

In addition to relying on company controlled ore reserves to supply the new facilities, Union Carbide will purchase a certain amount of amenable ores from independent producers in the respective regions.

Construction of the new mill and stations will be completed in the fall of 1957 under a contract with Catalytic Construction Company of Philadelphia.

Continental Uranium Inc. has acquired nine claims in San Miguel County, Colorado. The claims are two groups: the first consists of the *Yorkton, Shady Side No. 1, Starlight,* and *Shady Side No. 2* located in Little Gypsum Valley. Sellers were Keith B. Redd and Bruce Sparks of Monticello, Utah. The second group is located four miles from the first and includes the *Navaho, Last Chance, Navaho No. 2, Red Top,* and *Last Chance Fraction.* These are being leased from a group headed by Arnold J. Weil of Dallas, Texas. Prospect drilling has started.

Union Carbide Nuclear Company is conducting a drilling program on the property of *Ajax Uranium Company* in San Miguel County, Colorado. Ajax did some drilling there about a year ago and found ore at depths of from 375 to 390 feet but the beds cut were not thick enough to warrant mining at that depth.

Universal Mining Consultants of Grand Junction, Colorado has completed a grid survey of the *Betty* group of claims located northeast of Gunnison, Colorado. The property is held by J. M. Buffington, Art Fordham, and the *Neece Exploration Company.* Neece, a Texas firm, will do the preliminary drilling with deeper exploration at a later date.

The *Uranium Institute of America* has been formed to work for the "general betterment of the uranium industry." Its headquarters are in the Uranium Center Building at Grand Junction, Colorado, and Admiral R. W. D. Woods (U.S.N. Ret.) is president.

Lisbon Valley Uranium Company has leased nine claims in San Miguel County, Colorado near Telluride. These properties are the *Modena, Gertrude,* and *Little Bessie* mines which were operated for gold, silver, and copper in the 1900-1920 era. The company is also interested in the *Chautauqua* mine near Montezuma and has men cleaning out the drifts.

Jimtown Uranium Company has received a $16,000 DMEA loan to explore for uranium in Boulder County, Colorado. The government's share of the loan is $12,000.

Beaver Mesa Uranium Inc. of Grand Junction, Colorado has announced plans to increase production from a monthly average of 1,600 tons to 3,000 tons. The expected increase will come from the firm's *La Salle No. 1* and *La Salle No. 4* properties, and from the *Rajah No. 28* and *Rajah No. 67.* A cross cut has been driven from the existing Cherokee shaft to gain access to the La Salle No. 4 ore body, while a second cross cut 600 feet long will provide access to the La Salle No. 1. A shaft has been sunk to 330 feet on the Rajah No. 28. Ore will be removed through the new shaft. Access to a known ore body on the Rajah No. 67 will be through existing workings on Beaver Mesa's *South Pack Rat* properties which are now in production.

The DMEA has granted exploration contracts to two groups in Colorado; Jack S. Josey and F. C. Roper have received a $39,586 contract to explore for uranium in Fremont County; the government's share is $29,689. *Gormax Mining Company* has received a $56,720 contract to explore for lead-zinc in Mineral County; the government's share is $28,360.

General Minerals Corporation is equipping its *Gold Links* mine near Gunnison, Colorado, and will sample along the Sacramento vein this summer. Extensive sampling and assaying of veins as well as old dumps will be carried on for several months. The company has also started work on the Summitville properties.

Lisbon Uranium Corporation has awarded a $250,000 shaft sinking contract to *Gene Bishopp, Inc.* of Grand Junction and Golden, Colorado for a 600-foot, two-compartment shaft on its *Ike* and *Nixon* claims in the Big Indian district of Utah. A second shaft will be sunk later in the year on the *Judy Lee-Columbia* claims. The vertical Ike shaft is to be finished by the end of this year, and in operation in 1957. The two shafts will be about a mile apart and some consideration is being given to the idea of connecting them by tunnel or drift. Lisbon is 70 percent controlled by Floyd Odlum's *Atlas Corporation.*

The *Third Annual Rocky Mountain Minerals Conference* will be held September 26, 27, and 28 at the Newhouse Hotel in Salt Lake City, Utah. Sponsor of the event is the Utah Section of the AIME. The program includes technical sessions, symposiums, field trips, the "Miner's Breakfast," and the mining companies and suppliers cocktail party. Write to the Utah Section, AIME, 815 Kearns Building, Salt Lake for additional information and hotel reservations.

An active campaign to promote industrial uses of nuclear energy and assure a constant future market for uranium ore has been launched by the *Uranium Association of America.* The group has headquarters in Moab, Utah and Washington, D.C. Jack C. Turner of Moab is president, and Colonel Ted E. Enter is managing director.

Sidney Mining Company and *Mascot Mines, Inc.* of Kellogg, Idaho have been granted an initial shipping contract for 300 tons of uranium ore from their *Hatch Point* joint venture in San Juan County, Utah.

Uranium mineralization has been found in several drill holes at around 120 feet in the *Fry Mesa* property of *Silver Dollar Mining Company* in San Juan County, Utah's White Canyon area. Silver Dollar is a Spokane, Washington firm, and Elmer E. Johnston is president.

Western Gold and Uranium Inc. has begun producing from its *Silver Reef* property in southwestern Utah, and expects its flotation mill at the mine to go into operation in August. The Silver Reef is a 2,000 acre property with two mines—*Big Hill* and *Cobb.* A 125-foot shaft was completed at the Big Hill and a crosscut to silver and uranium ore was also finished. The Cobb is shipping 200 tons per month of silver ore to *American Smelting and Refining Company.*

In the Elk Ridge area, San Juan County, Utah, two Kellogg, Idaho, firms, *Lookout Mountain Mining & Milling Company* and *United Mines, Inc.,* are carrying on exploratory drilling. Their joint holdings include 170 claims checkerboarded over 10,000 acres. Holes are being drilled to depths of about 350 feet under direction of C. R. Ranney, geologist, and Eugene Iverson, mining engineer.

The U.S. Atomic Energy Commission has revoked the withdrawal of several parcels of public land and reserved minerals in patented lands in southwestern Colorado, southeastern Utah, and northwestern New Mexico, and restores such lands to the public domain for possible public entry. Total acreage involved is 60,968.83, which includes 6,622.76 acres in the Bradford Canyon and La Sal Creek areas of San Juan County, *Utah;* 8,199.18 acres in the Polar Mesa area of Grand County, *Utah;* 19,192.38 acres in

the Skein Mesa-Wild Steer Canyon area of Montrose County, *Colorado;* 11,875.81 acres in the Bluewater area of Valencia and McKinley Counties, *New Mexico;* 2,560.96 acres in the La Sal Creek area of Montrose County, *Colorado;* 12,517.74 acres in the Yellow Cat area of Grand County, *Utah.* The above acreages include 2,997.74 acres of private and state-owned lands.

Uranium Prospectors Company, Ltd. of Grand Junction, has been acquired by *Vitro Corporation of America,* and will become a Vitro subsidiary. Uranium Prospectors holds large reserves of a carnotite-type ore near Green River, Utah, and has shipped about 1,500 tons of this ore monthly to *Vitro Uranium Corporation's* mill at Salt Lake City. Vitro paid $50,000 in cash and will make additional payments based on ore production. It is expected that another Vitro subsidiary, *Vitro Minerals,* will operate the mines.

WYOMING

Seven rotary drills started shortly before July 1 on a 68,000-foot drilling program for *Phelps Dodge Corporation* on property owned by *Wyoming Uranium Corporation* in the Crooks Gap area of central Wyoming. *Sprague and Henwood* is contractor. Wyoming Uranium stockholders recently approved a joint ventureship type of agreement with Phelps Dodge. With seven drills working on property belonging to *Mile High Minerals Corporation,* Phelps Dodge now has 14 rigs running in Crooks Gap.

A large-scale drilling program has been started on 199 uranium claims in the Gas Hills area by *Amrad Oil & Minerals Corporation,* of Salt Lake City, Utah, which purchased the property for $25,000 cash and $75,000 worth of stock from Alfred Ellerby of Lander, and associates.

In its $3,000,000 drilling and development program on the *Mile High Minerals Corporation* property in the Crooks Gap area of central Wyoming, Phelps Dodge has drilled several holes to more than 1,100 feet. Uranium was encountered at that depth, but a decision as to whether it can be mined at a profit will await further drilling at that depth and in shallower deposits.

The *Aljob Mining Company* has reported it has mined $200,000 worth of 0.26 U_3O_8 ore at a total cost of $10,000 from an open-pit operation in the Gas Hills area of central Wyoming. The cost included stripping overburden, mining, and stockpiling the ore on the property. The stockpile will fulfill the company's quota at the AEC buying station at Riverton for 20 months. Aljob has requested an increased quota.

Seeking to have its delivery quota to the AEC buying station at Riverton, Wyoming, increased from 3,500 tons per month to 7,000 tons is *Vitro Minerals Corporation.* The firm has blocked out sufficient ore to ship at the 7,000-ton rate for several years.

Noramco Associates of Salt Lake City, Utah, has signed a mining contract with *Gas Hills Uranium and Development Company* for a part of its holdings in the Gas Hills area of central Wyoming. Several thousand tons of ore were mined from the property before operations were halted last year by litigation, which has recently been settled.

Shoni Uranium Corporation has started a $50,000 drilling program on its properties in the Gas Hills area of Wyoming in a DMEA participating contract. The government's share is $37,827. *Teton Exploration Drilling Company* has the contract for drilling 36,000 feet of hole. In addition, Shoni expects to spend another $15,000 to $20,000 for drilling during the balance of the summer.

Lucky Mc Uranium and *Utah Construction Company* are reported to have filed for additional millsite claims bringing their total acreage to 400 acres for the proposed uranium processing plant they are seeking permission to build in the Gas Hills area of Wyoming.

Extensive bentonite deposits have been located by the U.S. Geological Survey along the Big Horn River in Wyoming and Montana. The 1,300-square-mile area lies mostly on the Crow Indian Reservation.

An extensive drilling program by several contract rigs, partially financed by a D.M.E.A. loan, has been started on 23 uranium claims in the Gas Hills area of central Wyoming by *Riverton Uranium Corporation* of Riverton, Wyoming and Chicago, Illinois.

"Our X-RAY can take core samples at any point to 200 feet"

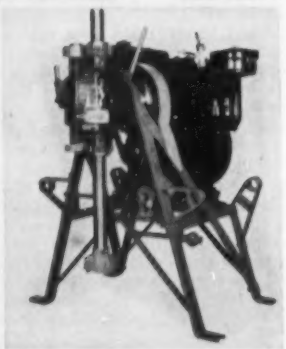
Say Jack Breham and Bob Murray, Career Prospectors about their

X-RAY DIAMOND DRILL

Jack Breham and Bob Murray of Culver City, California, together with Jim Burns, are career prospectors. In addition to being contract drillers, they are currently working a series of their own uranium claims in the Big Bear region of the Golden State.

The partners bought an X-RAY Diamond Drill at the time they went together. They picked an X-RAY after talking to other miners and claim operators, who nearly all agreed the X-RAY was the best available Diamond Drill of its size.

"Our X-RAY Drill can easily go to 200 feet," says Mr. Breham, "and we can take core samples at any point. I think it is the only Drill for light drilling, especially because it is easy to break down and pack into the claim. Our Drill uses little gasoline and is economical, mainly because we've never required repairs. When we need another Drill of the same size, it will be an X-RAY"



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Firms Option Wisconsin Low-Grade Iron Ore Land

Three mining firms have secured options on more than 5,000 acres of land containing low-grade iron ore and one of them—Ashland Mining Company—plans to begin preliminary operations late this summer.

The property is located in heavily wooded sections of northeast Wisconsin. It is considered the western end of the Gogebic Iron Range which is furnishing high-grade ore in the eastern section located in Michigan's Upper Peninsula. Geologist L. P. Barrett of Ishpeming, Michigan, in a report to the Ashland County Supervisor's Board, told the supervisors that the Michigan portion of the range "has a very short life." He added that "within 15 years, the Wisconsin end of this area rather than Michigan will be producing about 75 percent of all the ore that comes from the Gogebic Range."

The options are held by Ashland Mining Corporation, an affiliate of McLouth Steel Corporation of Detroit; Jones & Laughlin Steel Corporation, Pittsburgh; and the Snyder Mining Company, Chisholm, Minnesota, an affiliate of Crucible Steel Company and Shenango Furnace Company, both of Pittsburgh.

Jones & Laughlin has options on 500 privately owned acres in southern Ashland County and 1,600 acres in Iron County. Snyder Mining has options on 2,280 acres, all in Ashland County. Ashland Mining, with options on 760 acres near Butternut in Ashland County, has advanced the fastest in its development and plans to begin initial operations late in the summer. William B. Cudlip, a Detroit attorney who is president of Ashland Mining, said the land his firm holds under option contains 201,000,000 gross tons of taconite ore, bearing 28 to 32 percent total iron content.

Ashland's preliminary operations will include the building of a pilot plant where experiments would be conducted to determine how the mixture of silica and iron oxide, components of the low-grade ore, can be most economically separated.

The pilot plant would gradually evolve into a pelletizing plant where the iron oxide, in a dust form after being crushed, would then be concentrated into pellets. The firm plans to ship, via nearby Lake Superior, to its plants in Detroit.

In the pelletizing process the company expects to manufacture from the taconite a concentrate that will be 60 to 65 percent iron.

Mines Bureau Simplifies Mineral Facts Gathering

In gathering statistics on certain metals and on aluminum scrap, the U. S. Bureau of Mines has simplified its canvass forms and is working out cooperative plans with trade associations that already compile the same information from industry groups.

The Secretary of the Interior expects the plan to reduce substantially government paperwork and also the burden on industry resulting from duplicate reports.

A short, simple form replaces eight long, detailed ones formerly sent to small consumers to report their year-end stocks and use of chromium, cobalt, columbium-tantalum, nickel, tungsten, and vanadium. Large consumers are still asked to report separately on each metal.

Three titanium questionnaires have been combined into one general form. Previously the Bureau of the Census and the Business and Defense Services Administration, both of the Commerce Department, as well as the U. S. Bureau of Mines had separate forms.

Data on the use of aluminum scrap will now be obtained from the Aluminum Smelters Research Institute's monthly survey. The Bureau will canvass only firms that are not members of the Institute.

The Iron and Steel Institute and the American Petroleum Institute are also among trade associations cooperating with the Bureau to cut down on reports.

Geomar Mineral Research Laboratories has been organized in Rolla, Missouri to provide commercial testing and analysis facilities to the midwest. The laboratories, a major division of the newly formed *Geomar Minerals Corporation*, will consist of five integrated laboratories for petrographic and mineral analysis, X-ray, spectrographic, chemical, and radiometric analysis. Heading the new organization are George Sonewald, Jr., general manager, who was formerly with the U. S. Bureau of Mines, and Gordon B. French, petrographer and geologist, until recently assistant research geologist with the *St. Joseph Lead Company* and instructor in mineralogy at the Missouri School of Mines.

The first commercial primary uranium processing mill in the eastern United States will be built by *Vitro Rare Metals Company*, a division of *Vitro Corporation* of America as an extension to its present Canonsburg plant in Pennsylvania. About $1,000,000 will be spent for the project which will include doubling the size of the existing plant. The present plant has been equipped for the hydrometallurgical processing of uranium ores and other metallic waste materials, and for the refining and recovery of rare metals for industrial use. The new plant will allow technical and reagent grade chemical production and will permit milling and processing of uranium, particularly residues.

Davison Chemical Company, a subsidiary of *W. R. Grace & Company*, and *Rare Earths, Inc.*, an affiliate, have opened a new processing plant for converting monazite sands into rare earths and thorium at Curtis Bay, Baltimore, Maryland. Equipped at a cost of $2,000,000, the plant has a capacity of 25 tons of monazite sand a day. Average yield is 6 percent thorium and 60 percent mixed rare earth oxides. The plant is currently processing monazite from the national stockpile. The thorium content will be recovered for AEC stocks and the rare earths will be returned to the stockpile.

The *Crane Company* and *Republic Steel Corporation* have become equal partners in *Cramet Inc.*, a titanium sponge producer formerly owned by Crane. Cramet will remain a separate corporation. It operates a plant at Chattanooga, Tennessee which produces 6,000 tons of titanium sponge annually.

American Cyanamid Company will build a 200,000-ton-per-year triple superphosphate plant at Brewster, Florida on an existing company site where phosphate rock is mined. Construction has started and is expected to be completed in 1957. *Chemical Construction Corporation*, a Cyanamid subsidiary, will design and construct the plant in collaboration with *Dorr-Oliver, Inc.* The new plant is a company move to further diversify its line of chemical fertilizers.

A new plant to recover cadmium has been completed by the *New Jersey Zinc Company* at its Palmerton, Pennsylvania smelter. Cadmium occurs in many of the company's zinc ores, and, until now, had been sold to other smelters to be recovered as a byproduct. At Palmerton, the new plant is equipped to complete the processing to obtain cadium in metallic form.

Dravo Corporation has started construction on two of the nation's largest iron ore sintering plants; both are being built for the *United States Steel Corporation*. One will be located at Gary, Indiana, the other at Saxonburg, Pennsylvania. Initial capacity of each will be in excess of 15,000 tons of iron ore sinter daily. Each will have three machines, with provision for adding a fourth at a later time. The Gary plant will process iron ore from U.S. Steel's properties on the Mesabi Range of Minnesota. The Saxonburg plant will process iron ore shipped from Mesabi and from the company's new mines in Venezuela. The plants were designed in collaboration with and under license by *Lurgi Company* of Frankfurt, Germany.

Two new potlines are replacing older models at the *Aluminum Company of America's* plant at Massena, New York. The new lines will be housed in four potline buildings with supporting facilities, such as a rectifier station, and structures for additional carbon electrode manufacture, etc. Alcoa is also studying the possibility of constructing a marine terminal at Massena.

Kennecott Copper Corporation has formed a new subsidiary—*Kennecott Titanium Corporation*—to develop the 125-acre tract of land at Tonawanda, New York the company has purchased. The company is reported to be considering erection of a titanium sponge plant there.

Humphreys Gold Corporation's Highland plant at Lawtey, Florida has been placed on a seven-day work week schedule because of the increased demand for ilmenite at the *E. I. duPont de Nemours & Company* plant in Delaware. The Highland plant is operated for duPont by Humphreys, as is the Trail Ridge plant near Starke.

A *National Research Corporation* subsidiary reportedly will build a $25,000,000 plant at Pace, Santa Rosa County, Florida, for zirconium production. The plant will be built adjacent to the new

* A rubber railroad that laughs at Winter

* In rugged "high country" famed for tough weather, a large western mining company wanted to move ore at an ultimate capacity of 2,000 tons per hour for a distance of nearly a mile and a gain in elevation of some 350 feet ...and maintain capacity in mid-winter as well as in summer.

Stearns-Roger designed and constructed a conveyor system that does the trick. Its 42" wide belt operating in four sections, is housed in a barrel-ceiling enclosure. This structure is fully insulated and is heated by electricity for efficient operation even when outside temperatures slide to minus 30° F.

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CENTRAL AND EASTERN

Escambia Chemical Company plant built last year, and will use nitric acid and other products manufactured by Escambia in its operations.

IRON RANGES

A construction contract has been awarded to *Associated Builders Company, Inc.* for erection of heavy-media separation sections to one of the oldest concentrating plants on the Mesabi Range. The plant is that of the *Oliver Iron Mining Division* of *United States Steel Corporation*—the *Trout Lake* plant at Coleraine, Minnesota—originally operated in 1910. The new additions will be two conventional heavy media sections to treat the plus-¾-inch material, and two heavy media cyclone sections to treat the minus-¾-inch material. When completed the plant will treat 1,600 tons of crude per hour and will produce high-grade concentrates from the lean wash and retreat ores of the tributary mines on the western end of the Mesabi Range.

The *St. Paul* mine of *Pacific Isle Mining Company* made first shipments in June of direct ore and some wash concentrates through the newly constructed washing plant at the site. This mine was operated in the past by the *Republic Steel Corporation;* Pacific Isle took over the property this year.

Oliver Iron Mining Division of *United States Steel Corporation* estimates its production loss during the steel strike at 1,200,000 of ore shipped per week. *American Steel & Wire Division* of U.S. Steel is losing 20,000 tons of steel per week. The strike has also forced the lay-up of all boats of the *Pittsburgh Steamship Division* which transports ore for U.S. Steel.

M. A. Hanna Company has finished the modernization of all of its underground pumping in the Michigan District with the completion of the *Homer* mine pumping system. All underground pumping is now done by automatically controlled centrifugal type pumps as compared with manually controlled piston pumps which used to predominate.

Oliver Iron Mining Division of the *U.S. Steel Corporation* has again opened its observation stands at eight open-pit mines on the Mesabi Range. In addition, the tours through the Pilotac (preliminary taconite) plant have been opened to the public again. They will remain open until Labor Day to permit tourists and native Minnesotans to view the various operations. More than 1,000,000 visitors have viewed Oliver's operations from their stands since 1951. Since 1954 more than 20,000 visitors have been shown through the Pilotac Plant. Each observation stand has available descriptive literature on the operation which may be seen from the stand.

The *M. A. Hanna Company's Hunner* mine and plant facilities (formerly *Parcel No. 3*) in Coleraine, Minnesota, are nearing completion and plans call for operation later in this year. This plant consists of a conventional heavy media section and a heavy media cyclone section.

Duval Sulphur Develops Three Copper Ore Bodies

Duval Sulphur and Potash Company is reported to have spent $500,000 in drilling and exploring its 65 claims in the Twin Buttes area of Pima County, Arizona, according to Osborne and Thurlow, members of the New York Stock Exchange.

An independent field report by the investment firm showed that drill rigs had been working in an equilaterial triangular pattern for more than a year with holes going to depths of 250 to 275 feet. About 100 feet of that depth has consisted of overburden, with the remainder copper ore close enough to the surface to be mined by open pit.

According to the report, the ore has been found in three separate bodies which are close enough together to be worked as one unit. Ore reserves are believed to be close to 80,000,000 tons, although the waste material between ore bodies has reduced average grade to between 0.8 percent and 1.0 percent Cu. Some of the expense might be alleviated by recovery of gold, silver, and molybdenum, says the report.

It is also believed that about $20,000,000 would be spent to develop the mine and a mill. Annual output is estimated at 43,000,000 pounds of copper.

George W. Wright has leased 10 mining claims in the Sierra Ancha Mountains of Arizona to R. P. Whitlock of Phoenix. Mr. Whitlock has an option to buy the properties for $100,000. Mr. Wright will receive 10 percent royalties from any ore sales, with minimum payments of $500 per month. All royalty payments are to be applied against the purchase price of the claims.

The *Last Chance Mining Company, Inc.* has acquired the *Denison* manganese claims in the Long Valley region of Coconino County, Arizona, and has started a major open-pit operation. A log washer, with a daily capacity of 2,000 tons, has been brought in from Virginia and is being erected at the mine site, a camp is under construction, and preliminary mining started. The company proposes to ship under the government's carlot program for manganese and also to market its product to battery manufacturers. Approximately 40 men are on the payroll, with local offices located in Winslow, Arizona. The Last Chance company is headed by W. A. Russ, president of the *Cavalier Coal Company* of Altoona, Pennsylvania, who is in Arizona directing his company's operations.

The *Northwest Development Corporation*, backed by Oregon and Arizona men, has taken over the old Monte Cristo mill 13 miles northeast of Wickenburg, Arizona, and is preparing it for production. Initially, the new organization proposes to haul ore to the mill from the *Abe Lincoln* mine, then at a later date to reopen the *Monte Cristo* mine for production. A crew of about 20 men is employed at present under the direction of Tony Trojanovich, superintendent, of Phoenix, Arizona.

An exploration program, including geophysical exploration and core drilling, is reported to have been started at the property of the *Squaw Peak Copper Mining Company*, near Camp Verde, Arizona, by *Ventures, Ltd.*

Knight Bros., Inc., are employing about 10 men mining and shipping copper ore from the Bonanza mine near Duquesne, Arizona. Frank P. Knight, Jr. of Hawthorne, Tucson, Arizona, is resident manager; Harrison Schmitt of Silver City, New Mexico, chief geologist.

Court Upholds Gold Miners

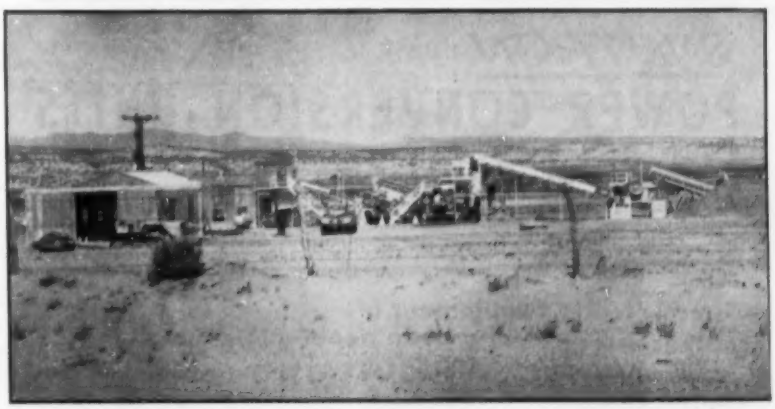
The United States Court of Claims has reaffirmed its previous decision (MINING WORLD, page 54, April 1956) that gold mining companies are entitled to recover damages from the government for forced mine closings under WPB L-208 during World War II.

International Metals Inc., Douglas, Arizona, has announced plans for construction of a new concentrate reducing plant to produce a refined tungsten product of 99.8 to 99.9 percent purity. According to Robert Martinolich, general manager, the plant will have a capacity of three tons a day, or 90 tons monthly, and will be able to handle the 65 percent concentrates, coming from the present clean-up plant, as well as lower grade material. International Metals confines its operations to tungsten ore mined in Sonora and Baja California, Mexico. Colonel Leverett Davis of Douglas will serve as consulting engineer.

Holly Minerals Corporation has purchased 76 asbestos claims, together with complete mining and milling facilities, from the *Western Chemical Company*. The property is located about 40 miles north of Globe, Arizona. This is reportedly the third producing asbestos mine to be acquired by Holly within the past year, and increases its Arizona properties to 2,600 acres.

The high price of copper has encouraged several mine operators in the Shasta County area of California to reopen old copper properties. The *Greenhorn* mine has been leased and a crew is currently reopening two of the six old mine adits. The *Mountain Copper Company* at Iron Mountain has converted from underground mining for pyrite to open pit mining for copper. Stripping is being done on the Brick Flat ore body, although some underground pyrite mining will continue from the company's *Hornet* mine. *Shasta Copper and Uranium Company Inc.* has obtained a lease on the *Shasta King* mine about four miles from Iron Mountain, along with several other properties, and is now diamond drilling the area. A diamond drill program is also in progress at the *Bully Hill-Rising Star group*, and some new underground mining development work has been carried out.

The Maritime Board in Washington, D.C. is considering a request from authorities at the Port of Stockton, California for permission to charter and operate 10 Liberty ships from the government reserve fleet in Suisun Bay. Port Director Elmo Ferrari says that the growing weight of the iron ore stockpile (now 100,000 tons) is endangering port facilities. The ore caused more than $150,000 damage to piers earlier this year. Unless action is taken, says Mr. Ferrari, Stockton will have to place an embargo on shipments of low-grade ore from Nevada and Utah to Japan.



AEC Ore Buying Station Opens in New Mexico

The Grand Junction, Colorado Operations Office of the Atomic Energy Commission opened a new ore buying station at Grants, New Mexico in July. The station, pictured above, will provide a market for limited quantities of limestone and sandstone ores produced in the Ambrosia Lake and other areas tributary to the Grants station. To assure a market for all producers in the Grants district, the potentially large producers will be limited to a reasonable tonnage of development ore, pending construction of milling facilities adequate to handle the output of these properties on a full production basis. Carnotite- and roscoelite-type ores will be purchased under the terms of Domestic Uranium Program Circular 5, Revised. Other types of uranium ores containing not more than six percent lime ($CaCO_3$) will be purchased at Circular 5, Revised, prices under the terms of ore procurement contracts with individual producers, provided the ores have suitable metallurgical characteristics.

Thousands of dollars in awards will be given for mineral and mining exhibits during the California State Fair and Exposition scheduled for August 29 to September 9 at Sacramento, California. The state's role in mining and minerals, from the Gold Rush in the Mother Lode a century ago to the modern developments in the field of salines, has long been recognized by the fair. Premiums, trophies, sweepstakes, and ribbons are offered in: precious metals, $4,000 premium money; California metals and ores, $1,350; and California nonmetallic minerals, $1,260.

Miracle Springs Mining Corporation was declared legal holder of 22 mining claims on federal power land in Kern County, California. The Miracle group had filed for a quiet title to the uranium claims. Defendants were *Transvalley Developers Inc., New World Exploration Research and Development Corporation, Delta Investors, Inc., United Nuclear Exploration,* and numerous individuals.

The 1956 Metal Mining and Industrial Minerals Convention and Exposition of the American Mining Congress will be held in Los Angeles, California during the week of October 1. Over 150 mining equipment manufacturers will display their products at the Shrine Exposition Hall. The committee formulating the program for the meeting is headed by Walter C. Lawson, general manager of *Phelps Dodge Corporation* in Douglas, Arizona. Garner A. Beckett, president of *Riverside Cement Company,* is chairman of the Western Division.

MacAfee & Company were recently granted a $28,600 DMEA contract to explore for nickel-cobalt-copper in San Diego County, California. The government's share of the project amounts to $17,875.

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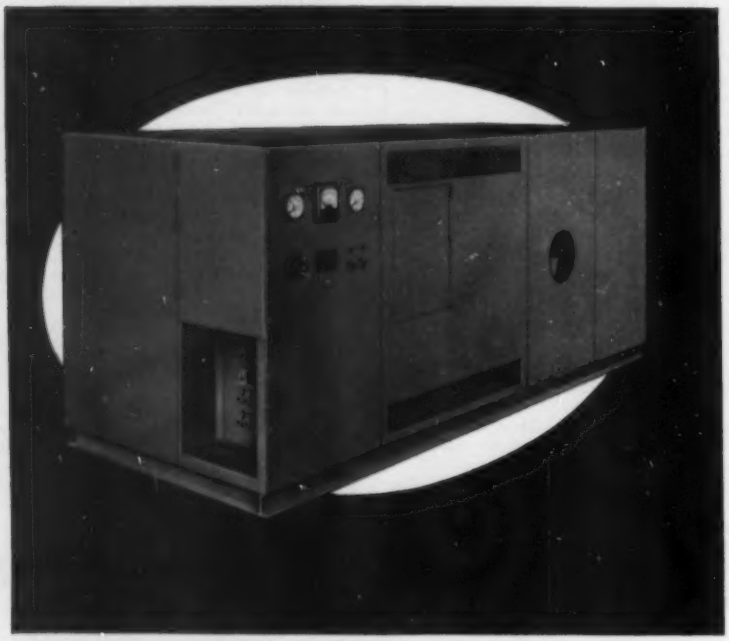

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Homestake Mining Company of Lead, South Dakota, is reported to have signed a $7,500 option with Paul Montgomery of Wells, Nevada for development of a scheelite property on Mt. Diablo, 5½ miles south of Wells. Mr. Montgomery located the claims in 1955 and shipped 60 tons of ore to the Getchell mill near Winnemucca. He reports that Homestake will probably complete a road to the main property and undertake extensive exploratory work during the six-month option period.

An apparent extention of its high-grade lead-silver-gold ore body on the 400-level has been reported by *Consolidated Eureka Mining Company.* A three-foot face of ore was opened in a drift off an inclined winze at the north end of the old *Diamond* mine in the Eureka district of Eureka County, Nevada. It is believed that the ore body is an extension down dip of the ore body now being mined further north.

Nevada Mercury Corporation is about ready to have its new flotation mill go into production near Lovelock, Nevada. The 100-ton mill reportedly will be the first in the state to adapt the flotation process for the treatment of mercury ores. The plant is located on the former mill site of the old *Juniper* mine, one of the company's mining properties.

The *U.S. Mining & Milling Corporation* has acquired control of the historic *Niveloc* silver mine near Silver Peak, Nevada and has purchased from Avery Brundage the 250-ton Bruhi mill eight miles away. U.S. Mining was formed by Leo A. Minskoff and Walter Minskoff of the New York firm of *Sam Minskoff & Sons, Inc.* for the purpose of operating these facilities. The mine was purchased from James Clark, Edward Murphy, and Leonard Traynor who will be associated in the new firm. Full-scale mining is expected to start as soon as the mine can be put back into condition.

Titanium Metals Corporation of America at Henderson, Nevada reports that its ingot smelting furnace has proc-

essed its 3,000,000th pound of metal. A sponge production expansion program is underway at the plant which is expected to raise sponge production from 3,600 tons to 6,000 tons annually by the end of 1956.

Mr. and Mrs. Walter Low have sold the *Eureka* group in the Miller Basin near Lovelock, Nevada to the *Miller Basin Mining Company* for $300,000. Sinking on the mercury ore body has started.

NEW MEXICO

Officials of McKinley County, New Mexico report that the *Anaconda Company* of Grants, New Mexico filed a total of 1,800 uranium mining claims in the County Clerk's Office recently, paying $3,048 in filing fees. This is the largest number of claims filed at any one time and it is the biggest day of filing in the history of the county. Location of these claims was not revealed because the claims had not been recorded at this writing.

Tidewater Oil Company has drilled 77,000 feet of core holes in 171 locations in preliminary explorations of the 250,000 acres it has leased from the *New Mexico & Arizona Land Company*. Under terms of the leases, New Mexico & Arizona Land would receive royalties on ore mined on a sliding scale ranging from 10 percent to 50 percent, depending upon the richness of the ore. The land firm also has an option on going into a 50-50 partnership with Tidewater on any mining and milling operations on the property. The drilling is to determine whether commercial quantities of uranium, thorium, and associated minerals are present.

New Jersey Zinc Company has acquired an interest in 2,240 acres of property in McKinley County, New Mexico, which is Indian allotment land. The *Canon Drilling Company* has started drilling operations for uranium.

As a result of approximately 129,700 feet of drilling completed on the number one and two phases, the *United Western Minerals Company* believes its orebody exceeds original expectations. Additional drilling on phase three will continue to block out the ore. Upon completion, the sinking of a shaft, and actual mining is expected to start. The property is located in the famous Ambrosia Lake district of New Mexico.

Richard D. Bokum of Santa Fe, New Mexico has announced that *Sabre-Pinon Uranium Company*, with which he is connected, and *American Metals Company* hope to build a uranium mill in the Grants area. Negotiations are underway with the A.E.C. and if results are favorable, Mr. Bokum said a mill costing between $8,000,000 and $10,000,000 will be in operation by 1958. He said that seven banks have agreed to participate in the financing.

Florida Manganese, Inc. has taken over the *Killion* group of manganese mines in Luna County, 10 miles east of Deming, New Mexico.

The *New Mexico Copper Corporation's* mill at Carrizozo, New Mexico has started processing lead, copper, and silver ore from the *Hurlow-Bingham* mines which are located near Trinity, site of the first atomic bomb explosion in central New Mexico. The mill also has been processing tungsten ore from *White Oaks*, famous old gold and silver camp. Ore from the *Surprise* mines at Nogal will be run at a later date.

Canamex Mining Corporation, through a subsidiary, reports it is exploring a favorable gold-copper property near Yerington, Nevada, adjoining the *Anaconda Company's* operations.

Atlas Uranium Corporation has added four Ambrosia Lake uranium claims to its holdings. The company has obtained a six-month option on 80 acres of fee land on the Ambrosia Lake structure of McKinley County, New Mexico. A small open-pit mine on the property has produced about 200 tons of ore from Dakota. Atlas Uranium plans to drill the *Westwater* section this summer.

Santa Fe Mica Industries of Santa Fe, New Mexico has registered an open-pit operation in Santa Fe County, the *White Crystal* mine. A. C. Scott is in charge. Other mica activities in northern New Mexico include the *Columbian Milling Company, Inc.*, with an open-pit operation in the Petaca mining district of Rio Arriba County; Vern J. Huffaker of Ojo Caliente who has a small mica mill; *A and M Mining Company* of Santa Fe mining at Mora, northeast of Las Vegas, New Mexico.

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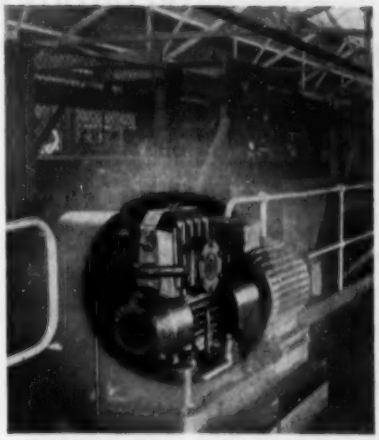

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Newmont Subsidiary Gets Additional Uranium Lands

A Newmont Mining Corporation subsidiary, Dawn Mining Company, was successful bidder at $340,000 for leases on four tracts of land totaling 458 acres in the Spokane Indian Reservation of Washington.

The company bid $317,500 for a key 120-acre tract adjoining the Midnite uranium mine, in which it has a controlling interest. The property line bisected a uranium ore body developed at the Midnite. A U.S. Atomic Energy Commission hole 75 feet across the boundary had indicated 50 feet of 0.30 percent uranium oxide, starting at a depth of about 25 feet.

Dawn had no competition on the key tract or on two other of the four tracts, but when the lands were first offered for bid a year ago, Dawn was third high. The high bid was $167,850 but the successful bidders were unable to obtain signatures of the Indian land owners.

Dawn's bid was accepted by the Portland regional office of the Bureau of Indian Affairs and the company confirmed reports that it has optioned sites near Loon Lake, Springdale, and Ford, Washington, for possible construction of a multimillion dollar uranium ore processing plant and ore buying station. Negotiations with the AEC are expected to be concluded in time to get a roof over the plant before winter snows start.

Stauffer Chemical Buys Part of S. F. Chemical

Stauffer Chemical Company has purchased a 50 percent interest in the phosphate mining operations of San Francisco Chemical Company in southeastern Idaho and southwestern Wyoming. The sale was made by Mountain Copper Company, a British firm, which has had full control of San Francisco Chemical until now.

The latter operates its own open-pit phosphate project near Montpelier, Idaho, and also operates a mine and plant on claims owned by Stauffer near Leefe, Wyoming. The company also has under development a part of the Crawford Mountain district of Rich County, Utah.

A diamond drill hole in the Rainbow area of the Silver Belt, Coeur d'Alene mining region, Shoshone County, Idaho, has disclosed two interesting silver-bearing veins. The showings are 525 feet north of a two-mile, below-sea-level lateral which *Polaris Mining Company* is driving easterly from its *Silver Summit* mine's 3000 level. L. J. Randall of Wallace is Polaris president.

Bradley Mining Company reportedly is reactivating its antimony smelter at Stibnite, Valley County, Idaho, to refine 2,000 tons of antimony cathode metal produced by *Sunshine Mining Company* as a byproduct of concentrating silver-copper ore at its property near Kellogg, Shoshone County. Refining would remove an arsenic content of about 3½ percent. It would take six to seven months. Operation of the smelter, only plant of its type in the United States, was suspended in 1951 because of a drop in the metal's price.

Sunset Mines, Inc. is doing diamond drilling under a Defense Minerals Exploration Administration project, driving a crosscut for *Lookout Mountain Mining and Milling Company* and milling ore mined by lessees from upper levels of the *Sunset* mine near Kellogg, Shoshone County, Idaho. Values are in zinc and lead. David Harvey of Seattle, Washington is president.

Goldstone Mining Company is diamond drilling its gold property near Salmon, Lemhi County, Idaho. Holes are being driven from the end of a 2,150-foot main haulage tunnel driven over the last few years. T. D. French of Wallace has the contract. B. W. Porter, Seattle, is president.

The Silver Mountain shaft east of Mullan, Shoshone County, Idaho has passed the halfway point at 1,000 feet. *Hecla Mining Company* is doing the work under a joint operating contract with *Bunker Hill Company*.

At the *Galena* mine west of Wallace, Idaho, *American Smelting and Refining Company* is pushing a project to connect new deep workings with the old Callahan winze which went down to the 1,600-foot level. A connection is needed to improve ventilation. J. C. Kieffer is manager.

An ore zone indicated by early-day maps is the objective of current exploration work by *New Rainbow Mining Company* at the old *Weber* mine near Lakeview, Bonner County, Idaho. Robert B. Austin of Wallace is president and manager.

Hecla Mining Company is driving an adit to test the downward extension of a pomising silver-lead-copper showing exposed by bulldozer trenching at the 36-claim *Princeton Mining Company* property east of Mullan, Shoshone County, Idaho. Hecla and *Bunker Hill Company* will acquire a 60 percent interest in the property after spending $600,000 o. when ore is found. L. J. Randall is Hecla president.

Oreanium Corporation of America, Inc. of Salmon, Lemhi County, Idaho, has been organized by Kenneth White of Sweet Home, Oregon, Maurice Gilbert, Portland, Oregon, and Beverly E. Carmack, San Angelo, Texas. It is capitalized at $49,000.

Idaho Custer Silver-Lead Mines of Wallace, Idaho has been incorporated to take over assets and liabilities of *Idaho Custer Mines, Inc.* Stockholders of the old company will be issued stock in the new on a share-for-share basis. The new stock will be assessed to provide funds to complete a DMEA exploration program at the *Livingston* mine in Custer County.

Black Rock Mines, Inc. of Mackay, Idaho has been incorporated by John C. Martin and George W. Ames of Renton, Washington, and R. R. Armstrong, S. A. Liening, and Lewis S. Armstrong of Seattle, with capital of $150,000.

Seasonal operations are under way at the *Gay* phosphate mine of the *J. R. Simplot Company* on the Fort Hall Indian Reservation in Idaho. Two new Euclid 30-ton scrapers and tractors are being used to remove overburden in the opening of two new pits. Strip mining is scheduled to begin here this summer. In another area, DW-20 ore carriers are being loaded by Northwest shovels in the removal of overburden. When the phosphoria has been exposed, mining will proceed as usual with the ore carriers shuttling to and from the pits to the crusher with the ore. This is then shipped by rail to Pocatello.

Huge Lead Boulders Found in Washington Mine

Boulders of 75 percent lead are being extracted from a new ore chimney in limestone found at the old Gladstone mine in Stevens County, Washington's Leadpoint district. Largest boulder extracted to date has weighed about 15 tons and is valued at more than $3,000. A total of 300 tons of ore valued at about $65,000 had been mined from an open pit, at last report. A chain and bulldozer-powered winch have been used to extract the boulders. The ore is then trucked to the Bunker Hill smelter at Kellogg, Idaho. The lessee, A. G. Lotze of Northport, plans to sink a shaft in the chimney. R. H. Graham of Spokane, president of Gladstone, is at left in the photograph above. He is shown with some of the boulders of 75 percent lead unearthed beneath a few feet of overburden. Largest lead boulder mined to date is shown in the picture at the right. The other boulder resembles a mastodon's tooth.

MONTANA

The *Anaconda Company* has started work on the Northwest deep level projects at Butte, Montana. Ground has been graded and leveled at the Missoula Gulch shaft and erection of the headframe has started. The area at the site of the Ryan shaft is now being leveled and graded pending start of this phase. Large amounts of overburden are being removed at the Berkeley open pit to expose the ore at lower depths.

Al Stovall has erected a gravity plant at Butte, Montana to treat 600 to 700 tons per day of ore containing black manganese oxide. Concentrates will be shipped to the Butte-Phillipsburg purchasing depot where the quota is one ⅓ to ⅔ filled.

Lisbon Uranium Corporation of Salt Lake City, Utah has purchased properties of *Bice Mining Company* in the Pryor Mountain of Carbon County, Montana. Terms have not been revealed. Bice has shipped a few carloads of ore from the area, mined from surface outcrops. There has been little underground exploration because of the difficult terrain.

Western Placer Mining Company of Missoula, Montana has been incorporated by William J. Walker, Roy B. Olson, and Henry S. Childs, all of Missoula.

OREGON

Several areas in Oregon have been selected for surface right determination this summer under Public Law 167. The *U. S. Bureau of Land Management* will examine T. 37, 38, and 39S., Rs 5 and 6W. All public domain land including O&C land will be examined. The *U. S. Forest Service* announces that it will examine in Quartzville area most of the southern part of T. 11S., Rs 4, 5, and 6E, and most of the northern part of T. 12S, Rs 4, 5, and 6E. Also, in the Little North Fork area of the Santiam River most of T. 8S., Rs 4 and 5E., and sections 3, 4, and 7 of T. 9S., R.6E. MINING WORLD's July issue (1956), pages 61-63, carries an exclusive interview on this subject. W. C. Sanborn and W. S. Davis of the U. S. Forest Service answer pertinent questions about the administration of Public Law 167.

WASHINGTON

Germania Consolidated Mines, Inc. at last report was stripping overburden from a vein discovered last fall at its tungsten mine in the Spokane Indian Reservation, southwestern Stevens County, Washington. Henry Franz of Lind is vice president and managing director.

An initial expenditure of $25,000 is planned by *General Uranium, Inc.*, at uranium prospects in northeastern Washington and northern Idaho. James L. Simpson, Coeur d'Alene, Idaho, is president; Edward F. Harris, Spokane, vice president; Donald A. Ericson, Spokane, secretary; and Ronald A. Eggart, Wallace, Idaho, treasurer. The firm has started exploration work on 21 claims in the new *Lamb Creek* uranium field west of Priest Lake, Pend Oreille County, Washington, and is also diamond drilling mineralized structures exposed by bulldozing on leased ground south of Mount Kit Carson, near Mount Spokane in northern Spokane County.

A new truck-mounted rotary drill is being used by *Pend Oreille Mines and Metals Company* in exploration north of its present zinc-lead mining operations in Pend Oreille County, Washington's Metaline district. Holes are being put down 2,000 to 3,000 feet, preliminary to extending the 4,000-foot incline shaft 2,500 feet. Production currently is between 1,500 and 2,400 tons of zinc-lead ore daily. Jens Jensen, Spokane, is president.

Affiliated Mines, Inc., is carrying on a percussion drilling program in the Mount Spokane district under the second uranium exploration loan granted by the Defense Minerals Exploration Administration in the Spokane area. The contract is for $9,460. Joe Kiefel is company presi-

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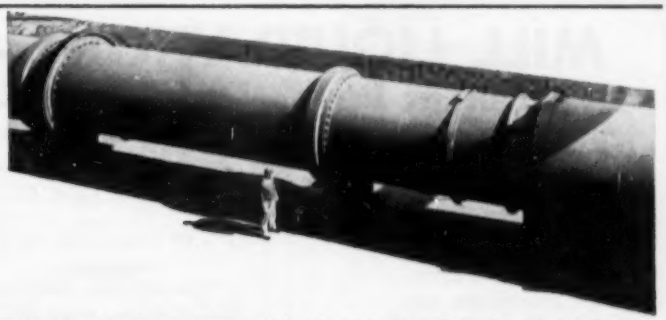

To tap the chemical resources of Searles Lake in California's Mojave Desert, it was necessary for the West End Chemical Company to set up a plant at the source of the raw product. Plant Equipment had to be rugged and dependable because repairs and replacement facilities were many long desert miles away.

Rotary dryers are vital to the West End process of manufacturing borates and soda products. Their first dryer in 1926 was a STANDARD-HERSEY and, with modifications, it is still in use. *West End has since purchased 26 additional* STANDARD-HERSEY *rotary dryers*—proof of STANDARD-HERSEY dependability.

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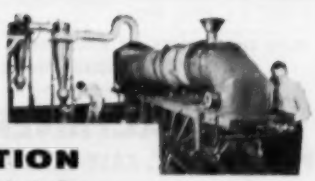

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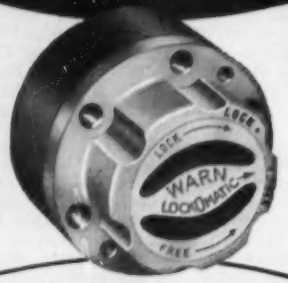

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dent and Donald C. T. Myhre, secretary-treasurer.

Utahcan, Inc., Spokane, Washington, has entered into agreements to explore and develop uranium prospects in northern Spokane County, southern Stevens County, and southern Pend Oreille County. Gordon Berkhaug is vice president and managing director.

J. M. Zickefoose has started work at uranium claims he staked last year in the Calispell lake region of Pend Oreille County, Washington.

Northport Copper Company has uncovered a new vein of copper ore at its prospect west of Northport, northern Stevens County, Washington. Joseph McNamee, president, and William R. Shauls, vice president, both of Newport, are supervising work.

National Silver-Lead Mining Company of Wallace, Idaho, which has a lead-silver prospect west of Wallace, has been reactivated under new management. It has entered into an agreement to prospect about three sections of land in the Spokane Indian Reservation, Stevens County, Washington. The land is held by *Northwest Uranium Mines* of Wallace, under prospecting permits. Nolan Brown of Cheney is president; S. K. Garrett of Wallace is consulting geologist.

Universal Mining Corporation, capitalization $2,000,000, has been incorporated to explore for uranium and base metals just north of the Spokane Indian Reservation in Stevens County and in Pend Oreille County's Metaline district. Incorporators are William D. and Richard Weaver of Spokane and Gladys McGregor, Seattle.

George Furler of Priest River has recorded four mining claim locations for uranium in Pend Oreille County, Washington, and Glen R. Husey of Ione, three claims in the same general area.

Eastern Star Mining Company, Wallace, Idaho, has started an exploration program on the 480-acre *Collett* lease north of the *Daybreak* uranium mine in the Mount Spokane district of northern Spokane County, Washington. H. R. Wellman is secretary-treasurer.

Dawn Uranium and Oil Company has trucked several truckloads of autunite ore from its Mount Spokane district open-pit operation to the Union Pacific Railroad's new loading dock in Spokane. The firm is investigating a Denver upgrading process. It has agreed to explore 880 acres in Stevens County under an agreement with *Indian Chief Uranium Company*. Ross Echlin, Spokane, is secretary-treasurer.

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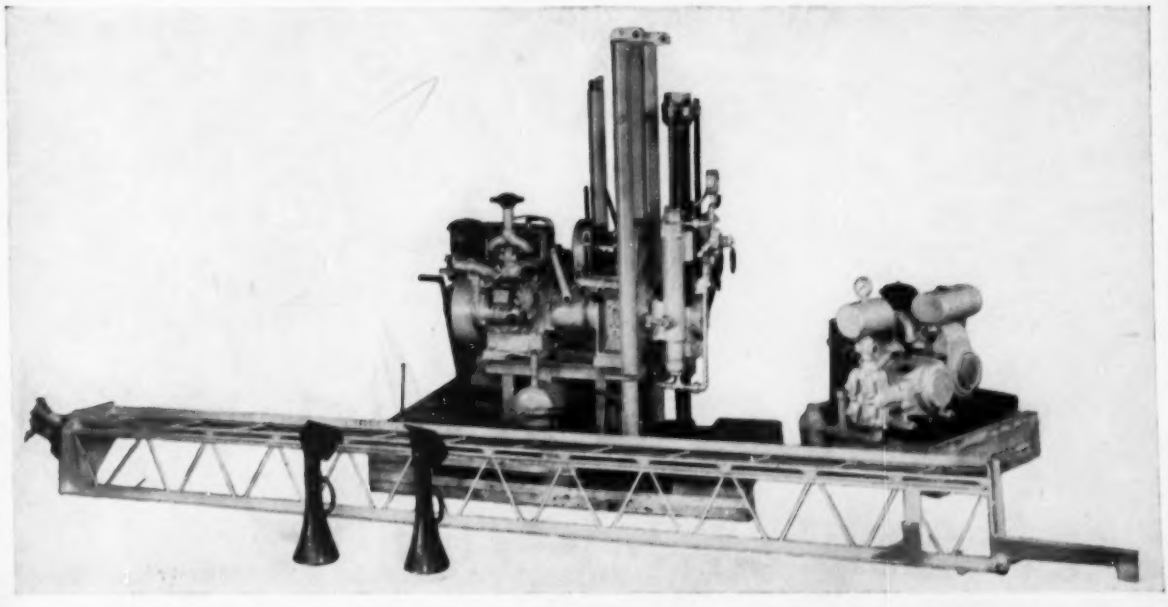

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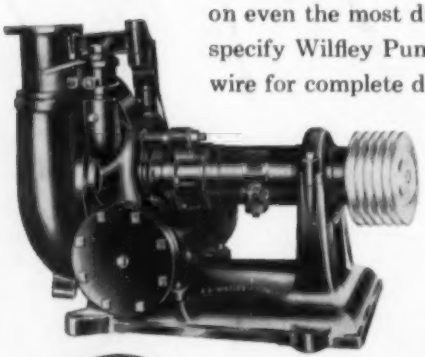

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